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SUMMARY OF RECENT ABSTRACTS*

III. MALARIA

[*Continued from* p. 191]

TREATMENT

General

COOPER (p. 1109) has written a most useful summary of antimalaria drugs, but for the essential details the original paper must be consulted. FIELD (p. 1110) has also summed up these drugs. COATNEY (p. 702) has published a résumé of the newer antimalarial drugs. KIKUTH and MUDROW-REICHENOW (p. 702) sum up the work done in Germany on antimalaria drugs, and show that atebrin, plasmoquine, Resochin (chloroquine) and Sontochin were first prepared there.

COOPER *et al.* (p. 1004) report their experiments to determine the maximum effects of mepacrine in prevention and cure of *P. vivax* infections (St. Elizabeth strain). These and the following experiments, which should be studied in the original, were part of the United States investigations related to the war. Similar work was done by the same team (p. 1005) with Sontochin, which, though not a causal prophylactic, was effective in suppressing or interrupting attacks. Chloroquine was also investigated (p. 1006) ; it also is not a causal prophylactic, but is very active against blood forms of *P. vivax*. The compound SN 6771 was also tested against the St. Elizabeth strain (p. 1007), but its action was poor. The same team (pp. 1111, 1112) show that the compounds SN 5241 and metachloridine have only poor curative action on *P. vivax* (St. Elizabeth strain), and that colchicine, SN 7266 and SN 8557 failed to prevent relapses. Pamaquin, on the other hand, was very effective in preventing relapse.

References are made on pp. 114–115 to two series of studies on antimalaria drugs, which should be studied in the originals.

GRAY and HILL (p. 711) report studies on quinoline derivatives in relation to antimalaria activity, but these should be studied in the original.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1949, v. 46. References are given under the names of the authors quoted, and the pages on which the abstracts are printed.

MACKERRAS and ERCOLE (p. 700) studied the action of quinine, mepacrine and pamaquin on *P. vivax* and *P. falciparum*, by examining blood slides taken at various intervals after administration.

Prophylactic drugs in invertebrate hosts are those which are effective against the pre-sporozoite stages, and which prevent the formation of sporozoites when they are ingested, in sugar solution, by the mosquitoes. TERZIAN *et al.* (p. 909) have found that suppressive drugs (atebrin, plasmoquine, quinine) do not have this action, but that sulphadiazine, metachloridine and paludrine have it against *P. gallinaceum* in *Aëdes aegypti*, and paludrine against *P. falciparum* in *A. quadrimaculatus*. The action of sulphadiazine and metachloridine, but not of paludrine, can be interfered with by para-aminobenzoic acid.

Quinine and other alkaloids

In quartan malaria a daily dose of 1 gm. quinine is as effective as a daily dose of 2 gm. WINCKEL (p. 904) argues that the smaller dose is better because it does not damage the body cells, and therefore does not interfere with the development of antibodies to the parasites.

SANDERS and SANDERS (p. 323) write of the value of intravenous quinine in malaria in a group of patients in the United States, but as diagnosis was only exceptionally confirmed by the finding of parasites, and as other drugs were taken by the mouth, the value of the treatment is difficult to assess. For cerebral malaria BLACK (p. 1110) thinks that intravenous paludrine is not the best treatment because parasites anchored in the cerebral capillaries are not at the very early stage at which paludrine acts. He advocates the intravenous injection of quinine, with paludrine by the mouth afterwards.

PLOYÉ (p. 212) writes of the danger of tetanus after injections of quinine.

MARSHALL and ROGERS (p. 324) have devised a method for determining quinine degradation product in blood. FERRARI (p. 520) describes a method for estimating the salts of quinine in the urine.

TALIAFERRO *et al.* (p. 1122) have sought evidence in chickens, infected with *P. gallinaceum* and treated with quinine, on the question whether the drug acts through some influence on the lymphoid-macrophage system, but their experiments led to the conclusion that the spleen and the drug act independently. They investigated the quinine blood levels in splenectomized and normal chicks, and conclude that although the reticulo-endothelial system may absorb quinine, it does not release it slowly into the blood with resultant longer contact between parasite and drug. The spleen is closely concerned in acquired immunity. Innate immunity, acquired immunity, and quinine act independently; quinine acts directly on the parasites, and may kill them, though their death is more commonly the effect of immunity processes.

DEARBORN (p. 333) has found, in ducks infected with *P. lophurae*, that the amount of quinine needed to suppress infection, when given as a single dose 24 hours after intravenous infection with parasitized red cells, was only one-third of the total needed when doses were given every four hours. It is not necessary to maintain a certain concentration in the blood.

KNOPPERS (p. 910) has produced two-fold resistance to quinine in a strain of *P. gallinaceum*.

BARANGER and FILER (p. 446) have found that the cinchona alkaloids act synergically with each other in blood-induced bird malaria.

JANG (p. 611) shows that an extract of the root of the Chinese herb *Dichroa febrifuga* possesses antimalarial properties similar to those of quinine. HENDERSON *et al.* (p. 614) have studied an alkaloid (γ-dichroine) from *Dichroa febrifuga*, for its antimalarial action in bird malaria (which is considerable).

Mepacrine

BALDI and DEL GIUDICE (p. 434) show from extensive records that treatment of malaria with mepacrine and similar compounds is more efficient if high initial doses are given (1·5 gm. daily for three days and then 0·3 gm. daily for four days) than if 0·3 gm. is used daily for seven days.

Metoquine (the Winthrop brand of mepacrine) has been used successfully in Spain (LOZANO MORALES, p. 436).

CIUCA *et al.* (p. 1115) describe the severe epidemic of malaria (mostly *P. falciparum*) which swept the Tulcea district of Rumania about 1946; the death rate was high. The chief vector was *A. sacharovi*. The epidemic was controlled by treatment of all known cases with mepacrine and pamaquin, but the authors are attempting control by DDT residual spray, which was not possible at that time.

BEDFORD (p. 601) found *P. vivax* in the blood of 5 of 100 airmen who had been taking suppressive mepacrine for at least a year, in an endemic area of malaria. The men were well, and none had had an attack of malaria (proved or "clinical") in the preceding year.

GUIJA MORALES (p. 684) has published a monograph on psychoses associated with malaria itself, and with treatment with mepacrine. It is, of course, difficult to decide whether a psychosis is due to the mepacrine or to the malaria for which it is given, but though he concludes from work on normal persons that mepacrine can provoke psychoses (though not easily), he thinks that a pre-existing tendency towards psychosis is an important feature. COLETTE and POROT (p. 607) report nine cases of psychosis which they attribute to the use of mepacrine in therapeutic doses. Five of the patients gave a history of previous mental trouble.

SCHMITT (p. 607) describes two types of mepacrine dermatitis, lichenoid and eczematous.

Paludrine (Proguanil)

COVELL *et al.* (p. 325) have studied closely the effect of paludrine on patients infected with West African strains of *P. falciparum*. It is a true causal prophylactic in a dose of 100 mgm. each day, but for treatment it is much less powerful than against the New Guinea strains. Unaided, it failed to effect radical cure of the West African strains, but did so when combined with mepacrine or quinine. The authors advise a course consisting of paludrine 300 mgm. twice daily for ten days, together with 900 mgm. mepacrine in three doses on the first day, and followed by 100 mgm. paludrine a day for six weeks. The same authors (p. 703) give a detailed account of work done in England on patients infected with a West African strain of *P. falciparum*, and treatment with paludrine. This work led to the statement issued by the Colonial Medical Research Committee (p. 608).

Writing of the treatment with paludrine of malaria (*P. falciparum* and *P. vivax*) in Eritrea, FERRO-LUZZI (pp. 213, 705) observes that the local strains are much more resistant than the strains originally studied from New Guinea. FAIRLEY (p. 1111) does not think that the development of some immunity to *P. falciparum* was a factor in the success of treatment with paludrine in the Cairns experiments, because the drug was given at various intervals after exposure. The New Guinea strain of *P. falciparum* used was very sensitive to paludrine, much more so than some West African strains.

MANFREDI (p. 114) gives 0·3 gm. paludrine each day for four days in the treatment of *P. vivax* infections in Elba, with good results. In Italy, GIOVANARDI *et al.* (p. 906) have found doses of 0·3 gm. paludrine daily for 15 days, followed by 0·3 gm. once each week for five weeks, most suitable for *P. vivax* infections. CIUCA *et al.* (p. 324) found that a single dose of 100 mgm. paludrine was enough

to stop an attack of syringe-transmitted *P. vivax* malaria, when given after several paroxysms, but that *P. malariae* is much more resistant.

The Malaria Advisory Board of the Malayan Union (p. 524) reports on the use of paludrine, which, with the malaria parasites of all species found in that area, is comparable in effect with mepacrine.

Paludrine has been used successfully in Panama (ROGNONI and PUYOL, p. 114).

Experiments in persons infected with *P. vivax* have convinced SEATON and LOURIE (p. 609) that there is little chance of producing strains resistant to paludrine by treatment with the doses usually employed.

HAWKING and PERRY (p. 219) provoked a high degree of resistance to paludrine in a strain of *P. cynomolgi* by treating infected baboons and a rhesus monkey with small doses for a long period. They argue that *P. vivax* may, perhaps, react in the same way to long treatment with paludrine. Resistance to paludrine in *P. cynomolgi* was observed by SCHMIDT *et al.* (p. 709), who treated infected monkeys with increasing but sub-curative doses, and transmitted the infection by passage. With other antimalaria drugs, resistance could not be provoked, and the authors think that the mode of action of paludrine is different from that of the other drugs. ROLLO *et al.* (p. 118) failed to produce resistance to paludrine in *P. gallinaceum* when the drug was first given after the phase of parasitaemia in chickens infected by mosquito bite, and continued for a year. It seems, therefore, that there is little danger of producing resistant strains if the exo-erythrocytic forms are subjected to prolonged suppressive treatment.

BISHOP and MCCONNACHIE (p. 119) have subjected a strain of *P. gallinaceum*, already rendered resistant to paludrine by long treatment, resistant to sulphadiazine by treatment with that drug. The strain also became resistant to other sulphonamides. Resistance to sulphadiazine may develop after long exposure to paludrine alone.

SICCA (p. 911) has confirmed the therapeutic and prophylactic activity of paludrine against *P. gallinaceum*.

Paludrine reduces secretion of gastric juice, and this fact may be related to the gastro-intestinal symptoms which may occur after administration (BURN and VANE, p. 326 ; VANE *et al.*, p. 326 ; DOLL and SCHNEIDER, p. 326). Chronic toxicity was investigated by SCHMIDT *et al.* (p. 327) who showed that the symptoms after administration by stomach tube (in animals) were predominantly gastro-intestinal. COVELL (p. 327), however, makes the point that in doses generally used in prophylaxis or treatment of malaria, paludrine has no adverse effect on the digestive system.

CHAUDHURI and CHAKRAVARTI (p. 325) treated patients with intravenous paludrine acetate ; most of the patients were seriously ill, but the results on the whole were favourable. MULLICK and GUPTA (p. 520) have used paludrine intravenously in India. Tablets were dissolved in water at the rate of one tablet (0·1 gm.) to 5 ml., allowed to sediment, and the supernatant fluid was used, after centrifugation. The dose was usually 20 ml. A single injection was usually enough, but in some cases a second was needed.

HAWKING and PERRY (p. 334) conclude, from experiments with *P. gallinaceum* in culture, that paludrine is probably not itself the active antimalaria agent, but that another substance is produced by the action of body cells on paludrine, and that this is the active substance.

Antimalaria drugs antagonize the action of adenosine, but paludrine does so only after it has been metabolized in the body (MADINAVEITIA and RAVENTÓS, p. 522).

A synergistic effect between paludrine and sulphadiazine on *P. gallinaceum* has been observed and studied by GREENBERG *et al.* (p. 119). He (p. 912) has

now produced a strain of *P. gallinaceum* which is resistant to paludrine and hypersensitive to sulphadiazine. This suggests that the drugs act on different enzyme systems, but the results are not the same as those obtained by some other workers. The same author (p. 1124) shows that the antimalaria activity of paludrine is inhibited by pteroylglutamic acid, which also inhibits some sulphonamides. Quinine, chloroquine and pamaquin are not thus affected. FALCO *et al.* (p. 1125) show that there is no definite correlation between pteroylglutamic acid antagonism and antimalaria activity; purines may be involved.

SPINKS (p. 118) has studied the blood concentrations and physiological distribution of some homologues of paludrine, in relation to their antimalarial activity. These vary greatly in their action on *P. gallinaceum*, but the low therapeutic action of some cannot be explained by poor absorption or low concentration in cells.

Prophylactic use.—COVELL *et al.* (p. 437) have studied the prophylactic action of paludrine on *P. falciparum*, a West African strain of which was transmitted by *A. stephensi* in England. Doses of 100 mgm. or 50 mgm. daily, 100 mgm. twice weekly, or 300 mgm. once weekly were enough to prevent attacks, and the drug acted as a true causal prophylactic. For non-immune people living in West Africa the authors advise 100 mgm. daily; for semi-immune people 300 mgm. once each week. DAVEY and SMITH (p. 706), however, quote a case from Nigeria in which 0·1 gm. paludrine was insufficient to prevent a break-through of *P. falciparum* malaria. JELLIFFE (p. 806) also quotes three instances from Nigeria in which prophylactic doses of 0·1 gm. each day were not sufficient to prevent *P. falciparum* malaria. In each case an intercurrent infection was present. The author thinks that the prophylactic dose should be increased to 0·2 gm. daily during intercurrent infections. Although paludrine taken regularly (0·05 gm. each day) appears to be an effective suppressant in a hyperendemic area of *P. falciparum* malaria in the Sudan, ABBOTT (p. 705) has found the drug disappointing in the treatment of attacks.

CIUCA *et al.* (p. 329) report experiments which indicate that paludrine acts as a causal prophylactic in sporozoite-induced *P. falciparum* infections, provided that the doses given are reasonably big.

KLOPPER (p. 907) has used paludrine successfully as a suppressive during the malaria season in North Holland. The dose was 0·1 gm. each week for adults.

MALLIK (p. 216) found paludrine effective as a suppressive in a small community of people in India.

In Mexico BELTRÁN and NIETO (p. 806) found that two doses of 0·1 gm. paludrine each week were effective in preventing malaria in troops.

TERZIAN and WEATHERSBY (p. 609) have shown that when *A. quadrimaculatus*, fed on patients infected with *P. falciparum*, were given paludrine in sugar solution added to their diet, complete development of oöcysts was prevented, and sporozoites were never present. This was not so when quinine, mepacrine, Sontochin or sodium sulphadiazine were used.

Chloroquine

KENYON *et al.* (p. 804) relate the story of the testing, and development of manufacture, of chloroquine and its derivatives in the United States.

In a comparative test of several antimalaria drugs in troops HERING *et al.* (p. 904) found that chloroquine gave rise to fewest complaints, and mepacrine to the greatest number. Chloroquine can safely be given by intramuscular injection, in doses of 200 mgm. of base, repeated in four hours, but oral treatment should be started as soon as possible (CULWELL *et al.*, p. 905). BERBERIAN and

DENNIS (p. 707) have found chloroquine a most useful suppressive and therapeutic agent in malaria in Lebanon. It can be given in effective doses to infants and pregnant women. DOUCET (p. 214) writes favourably of chloroquine in treatment of *P. falciparum* and *P. malariae* infections of children in the Belgian Congo.

CHAUDHURI *et al.* (p. 610) used chloroquine in infections with *P. vivax*, *P. falciparum* and *P. malariae* in India. They noted that its action was rather more rapid than that of quinine, mepacrine or paludrine, but there were some symptoms of toxicity.

HILL and AMATUZIO (p. 905) treated in America soldiers who had contracted *P. vivax* infections in the south-west Pacific. Chloroquine was no more effective than mepacrine in preventing relapses. In patients treated with drugs not likely to eradicate the infection, relapses occurred as late as the fourth year in 4·3 per cent.

VAN DER WALLE (p. 805) has used chloroquine (aralen) with great success in *P. vivax*, *P. falciparum* and *P. malariae* infections in Peru. Slight toxic manifestations were noticed, but none was serious.

PACHECO *et al.* (p. 435) write favourably of chloroquine.

Suppressive medication with paludrine (a single dose of 0·3 gm. each week, or two doses of 0·1 gm.) or chloroquine (0·25 gm. of base once each week) proved very successful on a tea estate in Bengal (RAY, p. 612). [Chloroquine is now usually made up in tablets containing 0·155 gm. of base (0·25 gm. of the diphosphate). The tablets used by the author were evidently bigger.] On an estate in Malaya where, before the war, suppression by means of mepacrine had been the only really successful method of controlling the incidence of malaria (transmitted by *A. maculatus*), WALLACE (p. 1116) has made controlled trials of chloroquine ; chloroquine and pentaquine ; and neo-Premaline (chloroquine, pentaquine and rhodoquine). The results in all trials were impressive, though the numbers of cases in the control groups were not large.

SMITH *et al.* (p. 612) used chloroquine (0·25 gm. twice each week) and paludrine (0·1 gm. twice each week) as suppressives in the Philippines. In these doses the former was the more effective ; controls were heavily attacked.

Nivaquine (*Sontochin*)

DELAHOUSSE (p. 15) has treated *P. falciparum* malaria with Nivaquine [Sontochin], with good results ; it is as effective as mepacrine, and has the advantage that its toxicity is low and it is colourless. CANET (p. 328) has used Nivaquine C in treatment of *P. falciparum* and *P. vivax* infections in Cochin China, with results equalling those obtained with mepacrine. The toxicity of Nivaquine C is very low, and it does not discolour the skin. From Indo-China CANET (p. 521) writes that Nivaquine C (Sontochin) is as effective as mepacrine and acts rather more quickly. The same author (p. 705) compared the action of Nivaquine with that of paludrine in *P. falciparum* and *P. vivax* infections. Both were effective ; neither has any action on gametocytes of *P. falciparum*, and Nivaquine has none on gametocytes of *P. vivax*.

SOHIER *et al.* (p. 521) report good results in *P. vivax* malaria with Nivaquine C (Sontochin) and Nivaquine B (chloroquine).

Camoquin (*CAM AQI*)

Writing of the use of new antimalarial drugs in Egypt, HALAWANI *et al.* (p. 435) show that all those used were very effective but that Camoquin gave rise to toxic symptoms in some cases. Camoquin was used by PATEL and MEHTA (p. 436) with some success in India, but the doses were small. EJERCITO and DUQUE (p. 611) have found Camoquin effective in *P. vivax* and *P. falciparum*

infections in the Philippines, even when only a single dose of 0·4 was given. Camoquin was more successful than chloroquine, paludrine or oxychloroquine in *P. falciparum* and *P. vivax* infections in Brazil (MEIN and ROSADO, p. 436).

Pamaquin. Pentaquine

A War Office Report (p. 701) indicates that, in men who relapse with *P. vivax* malaria, treatment with quinine and pamaquin is more effective in preventing further relapse than treatment with mepacrine only. Another Report (p. 701) indicates that quinine and pamaquin were much more effective than paludrine alone for this purpose.

Pentaquine is a derivative of pamaquin, but is said to be less toxic. COGGESHALL and RICE (p. 706) treated 185 ex-servicemen, suffering from *P. vivax* malaria, with pentaquine and quinine, with very good effect on the prevention of relapses. Pentaquine is more effective when it is given concurrently with quinine than when it is given alone, but ATCHLEY *et al.* (p. 214) show that when it is given with quinacrine its toxicity may be increased, and that with sulphadiazine it may be dangerous. Experiments in human volunteers showed that pentaquine and quinine, used jointly, have clear-cut curative properties in treatment of infections with the St. Elizabeth strain of *P. vivax*, which were not shown by quinine given alone (WHITE *et al.*, p. 906).

Sulphonamides

Certain sulphonamides have been found useful in human and bird malaria; CANTRELL *et al.* (p. 911) have found that their protective power in chickens against *P. gallinaceum* depends on other factors besides blood concentration. Sulphamethyldiazine is a poor antimalaria drug (SCHNEIDER and CARUANA, p. 521).

Other papers on treatment

KIKUTH and MUDROW-REICHENOW (p. 220) describe the compound Endochin, a 4-hydroxy quinaldine, which shows considerable activity against some bird malaria parasites, but not against *P. knowlesi* of monkeys.

BOYD and COELHO (p. 804) describe a patient with *P. falciparum* malaria and an infection with *Clostridium welchii*, in which the latter apparently exerted a restraining influence over the malaria. After a chance observation that infection with *Cl. welchii* coincided with disappearance of parasites in a patient with *P. vivax* infection, GARCIA (p. 1112) found that two injections of tetanus toxoid after treatment with antimalaria drugs reduced very considerably the number of relapses in both *P. vivax* and *P. falciparum* infections. He thinks that the toxoid may have stimulated the reticulo-endothelial cells.

THIODET and FOURRIER (p. 215) treated four patients with *P. vivax* malaria by means of intradermal injections of CO_2-globulin prepared from the patients' sera. They discuss the rationale of this treatment.

CONTROL

General

D'ARCY (p. 216) sums up the policy to be adopted in the control of malaria in the British Army. In comment MACDONALD criticizes the authorities for not keeping abreast of the improvements which have been made during the last few years.

The Government of Madras (p. 116) has published a book on the control of soil erosion; the subject is important in relation to malaria, and a chapter is devoted to this aspect of it.

SHOUSHA (p. 438) describes the epidemic of malaria in Upper Egypt which followed the introduction of *A. gambiae* from the Sudan during the early part of the war. It was controlled, and the mosquito was completely eradicated, by the activity of members of an organization specially created to deal with it. This elaborate organization is described ; its basis was treatment of all potential breeding places with paris green once each week. The details of the organization, and its system of cross-checking, deserve study. A similar campaign was later carried out in the neighbouring part of the Sudan, with the intention of providing a barrier to future invasions of Egypt by eradicating *A. gambiae* as far south as the natural barrier formed by a long stretch of Nile valley where there are few opportunities for breeding. LEWIS (p. 523) describes this campaign.

CHWATT (p. 1117) writes favourably of the control of *A. melas* by coastal swamp drainage, at Lagos, Nigeria. By this means alone the density has been much reduced, and valuable land has been reclaimed. Residual insecticide spray would not achieve the same results because there are only few human habitations near the main breeding place.

RAO and RAMAKRISHNA (p. 17) show that growth of the water plant *Eichhornia* does not inhibit the breeding of *A. sundaicus* in Orissa, though it apparently does so in Bengal.

PETTMAN (p. 217) has studied the flushing of streams for the prevention of breeding of *A. minimus* in Assam, particularly in relation to the head of water, fall of stream and length of effective control.

FLETCHER (p. 116) has observed that when ducks began to use a pond in Georgia, formerly a source of very numerous larvae of *A. quadrimaculatus* and *A. crucians*, the larvae disappeared.

The problems involved in attempts to control malaria and mosquitoes round the halting places along the inter-American highway in Central America, where *A. albimanus* and *A. pseudopunctipennis* are vectors, are described by JOBBINS (p. 441). HENDERSON (p. 218) discusses methods of dealing with *A. albimanus*, the vector in Porto Rico.

LINDUSKA and MORTON (p. 522) show that suits made of certain materials (which they name) gave good protection against mosquito bites, and also that there was excellent protection when open-mesh netting was worn beneath material which could be pierced by mosquitoes.

Insecticides

General.—GIGLIOLI (p. 1119) shows that the question whether residual insecticides will be effective against any species of *Anopheles* depends on its habits. Domestic mosquitoes like *A. darlingi* can be controlled, but others, like *A. bellator*, which are not domestic, are refractory. In between are species which vary in their response, but all require study.

THOMSON (p. 439) found evidence which suggested that *A. gambiae* which enter huts sprayed with DDT may be irritated (after feeding), and may leave the huts (except a minority which are actually killed). When search is subsequently made, no living adults are found, and the impression of a complete kill is produced. When Gammexane is used in place of DDT there is no irritation, and larger numbers of dead *A. gambiae* are found. In window traps considerable numbers of anophelines are found attempting to leave when DDT is used, but not when Gammexane is used. Gammexane appears, therefore, to be the more effective against this mosquito.

WALLACE (p. 613) conducted experiments on *A. maculatus* in Malaya, which indicated that DDT, BHC and Chlordane were all lethal to the mosquitoes, did not prevent them from entering rooms and feeding, and all reduced early

morning catches, sometimes to nil, but without evidence of dead mosquitoes in the rooms. But there was no reduction of larval density in the breeding places of the area, and no effect on the incidence of malaria. In comment TREDRE recalls similar findings (in the case of DDT) made by Muirhead THOMSON on *A. gambiae* (see above).

ETHERINGTON (p. 908) noticed that DDT had an irritant effect on *A. maculipennis* var. *labranchiae* in Italy, which is in line with its effect on *A. gambiae*, reported by Muirhead THOMSON, above.

STIERLI and STENBURG (p. 708) describe some developments in insecticide dispersal equipment. DE MELLO and PINTO (p. 1120) describe certain improvements in the technique of spraying houses with insecticide.

DDT.—PAMPANA (p. 443) has published a survey of methods of malaria control by residual DDT spray, and the methods of testing results; he has related these methods to costs.

AZIZ (p. 16) continues his series of papers on *Anopheles* eradication in Cyprus, where DDT in oil is used on a large scale for the treatment of all possible breeding places, and as a residual spray in buildings. SHELLEY and AZIZ (p. 807) describe the development of the *Anopheles* eradication scheme which has been in progress in Cyprus since 1946. Remarkably good results have been achieved, and eradication of the mosquitoes and the disease may soon be achieved. FLORIS (p. 117) discusses the effects of the 1947 antimalaria campaign in the Province of Cagliari, Sardinia, where DDT residual spray was used on a large scale.

GARNHAM (p. 1114) describes the control of malaria in the Kenya highlands, where it is transmitted seasonally by *A. gambiae*, by DDT residual spray in houses.

VISWANATHAN and RAMACHANDRA RAO (p. 16) describe their methods of DDT residual spray in a very large control scheme in Bombay Province, where *A. fluviatilis* and *A. culicifacies* are vectors. The results, measured by spleen rates and parasite rates after one year of spraying all human and animal shelters every 6–8 weeks, were very encouraging. In Delhi Province AFRIDI and SINGH (p. 17) have organized a scheme for malaria control by DDT residual spray.

NAIR (p. 709) in India applied DDT in kerosene as a barrier spray to strips of ground 50 yards wide round experimental sites. There was an immediate disappearance of anophelines (presumably mostly *A. sundaicus*) and a great reduction in culicines. He (p. 1118) has used a similar technique in Malaya with success where *A. maculatus*, *A. letifer* and *A. sundaicus* are prevalent.

TETZLAFF (p. 1118) describes the programme for the use of DDT as a residual spray in malaria control in the United States. In Georgia (U.S.A.) the malaria control programme is now based on the use of DDT residual spray twice during each malaria season at an interval of 10–14 weeks. LENERT and LEGWEN (p. 441) report considerable, but by no means complete, success.

DOWNS *et al.* (p. 614) found evidence of insecticidal action on the walls of mud-brick houses in Mexico, more than two years after application of DDT. Although in Mexico the use of DDT as a residual insecticide has very greatly reduced the numbers of *A. pseudopunctipennis* found in houses, GAHAN *et al.* (p. 1119) show that breeding still continues, though at a considerably reduced rate in the rice fields. They do not think that residual insecticide will eradicate this mosquito. No evidence by resistant strains was found.

On wooden walls, residual DDT (5 per cent. in kerosene) becomes completely ineffective against *A. darlingi* (at the rate of 2·09 gm. per square metre) in the eighth month after application (GALVÃO and DAMASCENO, p. 442).

For use as residual spray against *A. darlingi* and *A. albitarsis*, DA COSTA and BASSÈRES (p. 330) have found that DDT in water emulsion has better lasting qualities than DDT dissolved in kerosene.

DEANE *et al.* (p. 331) sprayed houses, in a town in Brazil, with 5 per cent. DDT in kerosene, at intervals of four months. Parasite rates and spleen rates showed a very marked decrease one and two years later, and *A. darlingi* became very difficult to find. In untreated areas malaria remained as before. PENIDO *et al.* (p. 332) discuss the results of DDT residual spray in the River Doce Valley, Brazil.

In Brazil, forest control is probably the best method of dealing with malaria transmitted by anophelines of the sub-genus *Kerteszia*, which breed in Bromeliads (FERREIRA, p. 332), but DE BUSTAMANTE *et al.* (p. 1120) have attempted control by applying DDT dust, or BHC dust, from a helicopter over wooded areas. Very considerable reduction in adults and larvae were effected (though there was also some reduction in control areas), but reinfestation took place in a short time.

HART *et al.* (p. 218) report good results from the use of DDT residual spray in part of Bolivia where attempts at control by suppressive mepacrine and application of paris green to water had not been successful.

Complete protection from malaria in part of Peru where the vector was *A. pseudopunctipennis* is claimed by CORRADETTI (p. 1027), who used DDT as a residual insecticide.

A programme for the eradication of malaria by means of DDT from Argentina, where the vectors are *A. pseudopunctipennis*, *A. darlingi* and *A. albitarsis*, is outlined by ALVARADO and COLL (p. 332).

NOÉ *et al.* (p. 1008) describe the antimalaria campaign in northern Chile, where the vector is *A. pseudopunctipennis*. The campaign was begun in 1937, and since 1944 DDT has been used as a residual spray and as a larvicide. Since 1945 no indigenous malaria has been found, and the claim is made that the anophelines have been eradicated.

FERGUSON *et al.* (p. 708) have summed up the literature on DDT as a mosquito larvicide.

BRISOU *et al.* (p. 523) use finely ground cork in which is incorporated 5 per cent. DDT, as a larvicidal agent. The preparation floats for about three weeks and collects about the grass and rushes, on the borders of marshes. It can be distributed by airplane, and in Tunisia proved very effective. Cork powder which has been immersed in 5 per cent. DDT in kerosene forms a good medium for use as a mosquito larvicide (DE NEGRI, p. 908).

HEISCH and WILSON (p. 330) think that the use of DDT smoke generators will not be useful in malaria control in East Africa.

Other insecticides.—DAVIDSON (p. 329) has used Gammexane as a residual spray in African villages in the Belgian Congo, with notable decrease in the number of anophelines caught and in the rate of infection. The Gammexane remains effective for 15–16 weeks, or longer, and it may prove necessary to spray only twice a year.

DDT, DDD, Chlordane and chlorinated camphene have been compared by MCCAULEY *et al.* (p. 524) as regards their effectiveness as residual insecticides against *A. quadrimaculatus*. Certain preparations of DDT were the most effective ; the original should be consulted for details. QUARTERMAN (p. 525) has studied the residual action of DDT and Chlordane in relation to dosage, re-treatment of surfaces, and the effect of furniture in treated rooms. Details should be sought in the original.

HOFFMAN and VAN RIEL (p. 908) have made interesting observations on infant mortality rates in a mining community in the Belgian Congo, before and after the beginning of regular use of ground pyrethrum flowers for dusting the houses. The area was highly malarious, and the vectors were *A. gambiae* and *A. funestus*. Houses were dusted twice each week. A spectacular reduction in

mortality and morbidity was observed, which was not found in control, untreated, areas.

KOIDSUMI and LIEN (p. 219) report that derris powder diluted with powdered rice-straw (or even soil dust) is an effective larvicide for *Anopheles* in Formosa, provided that the particles are from 0·177 to 0·297 mm. in diameter. They give information on the amount to be used in proportion to water surface.

Malaria of monkeys, birds, etc.

Monkeys.—SHORTT (p. 443) has given a description of the life cycle of *P. cynomolgi* in its insect and mammalian hosts, in the light of recent work on its exo-erythrocytic stages. A useful diagram is included.

LLOYD and SOMMERVILLE (p. 1122) have shown by experiment that sporozoites of *P. cynomolgi* injected into the skin of monkeys persist for two hours in the central part of the liquid inoculum, but disappear within four hours. The sporozoites are present in circulating blood up to 40 minutes after injection. It seems that many sporozoites are killed by phagocytes at the site of injection, but others escape by the lymphatic system. A mosquito may inject sporozoites directly into capillary blood.

COULSTON (p. 1009) has inoculated monkeys with heavy doses of sporozoites of *P. cynomolgi*, and describes the findings in necropsy or biopsy material taken at various times afterwards. These should be studied in the original, but one point may be noticed, namely that he reports exo-erythrocytic parasites in reticulo-endothelial cells of the liver, whereas SHORTT and GARNHAM found them only in hepatic cells. In comment, SHORTT criticizes certain features of this paper.

DUBIN (p. 526) has tested monkeys, infected with *P. knowlesi* or *P. cynomolgi*, by intradermal injection of antigens prepared in various ways from various species of malaria parasites. The results were not very striking, and the measurements of the skin reactions in infected monkeys were not much greater than those in normal controls, though statistical significance is claimed for certain results.

BALL *et al.* (p. 117) have studied the chemical and metabolic changes in red cells of monkeys infected with *P. knowlesi* both *in vivo* and *in vitro*. The paper cannot satisfactorily be summarized further.

MORRISON and JESKEY (p. 614) have calculated the extent to which haemoglobin of monkey red cells is converted into parasite pigment, and also studied various other metabolic changes, in *P. knowlesi* infection.

RIGDON (p. 333) has studied the effect of oxygen therapy and blood transfusion in monkeys infected with *P. knowlesi*, on the hypothesis that lesions in this infection are due to anoxia. RUSKIN and RIGDON (p. 1121) have studied the electrocardiogram of normal monkeys and those infected with *P. knowlesi*.

Squirrels.—FIELD and EDESON (p. 808) describe stages of *Plasmodium vassali* from Malayan squirrels. In comment, GARNHAM suggests that this organism should be placed in the genus *Hepatocystes*.

Birds.—Results obtained by RAGAB (p. 710) suggest that at 18° and 25°C., relative humidities of 60 and 70 per cent. increase the numbers of oöcysts found in *Aëdes aegypti* infected with *P. gallinaceum* over the numbers found at 50 per cent. R.H.

WILLIAMSON (p. 118) has constructed a nomogram for the rapid determination of dilution factors in the preparation of inocula for a standard dose of *P. gallinaceum* in chicks.

BACIGALUPO (p. 334) has transmitted *P. gallinaceum* by injecting dilute and filtered plasma of infected birds; he discusses the implication of this work.

MANWELL and FEIGELSON (p. 1011) have studied the utilization of glucose by *P. gallinaceum* in culture.

MOULDER (p. 445) has studied the effect of treatment of the host on the carbohydrate metabolism of *P. gallinaceum*.

The course of *P. gallinaceum* infections of duck embryos is described by MCGHEE (p. 808), who also (p. 809) discusses pre-erythrocytic development of *P. gallinaceum* in avian embryos.

LEWERT (p. 334) has studied exo-erythrocyte infection by *P. gallinaceum* in blood-infected chicks treated with quinine. Details should be sought in the original.

GRAMICCIA (p. 445) shows that if blood infected with *P. gallinaceum* is drawn from a bird whose internal organs contain exo-erythrocytic forms, it is always capable of infecting chick embryos. Otherwise the results are only occasionally positive.

Changes in the suprarenal glands of chicks infected with *P. gallinaceum* were observed by NADEL *et al.* (p. 809). *P. gallinaceum* infection seems to have no effect on the ascorbic acid content of the suprarenal glands of chicks (JOSEPHSON *et al.*, p. 1011).

BENNISON and COATNEY (p. 220) found significant differences in the response of male and female chicks to *P. gallinaceum*.

Extracts of various mammalian tissues were found by HAAS *et al.* (p. 909) to be toxic to *P. gallinaceum*.

PARAENSE (p. 808) describes experiments with *P. lophurae* in chickens.

With *P. lophurae*, egg-laying ducks do not develop the same heavy infections as male or non-laying female ducks, and this is correlated with the biotin content of their plasma. TRAGER (p. 446) shows that egg-laying activity is associated with relatively high biotin content and relative resistance to the infection.

MCGHEE (p. 912) has found that if mouse red cells are inoculated intravenously into chick embryos which have been infected with *P. lophurae*, the mouse cells (which have the power to survive) may become infected. No gametocytes were found in these experiments. In comment, GARNHAM refers to the possible uses to which this phenomenon may be put.

Plasmodium lophurae can be rendered resistant to paludrine, but THOMPSON *et al.* (p. 446) have been unable to induce resistance to camoquin or chloroquine by treatment with those drugs. Parasites resistant to paludrine remained sensitive to other antimalaria drugs.

MUDROW-REICHENOW and REICHENOW (p. 1126) in a paper completed in 1945, give a detailed account of the exo-erythrocytic development of *P. cathemerium* in the canary.

The duck is a suitable host for use in antimalaria screening tests with a strain of *P. cathemerium* (BUSH, p. 120).

PARAENSE (p. 447) has made observations on the exo-erythrocytic cycle of *P. juxtanucleare*.

WINGSTRAND (p. 615) writes on some haematozoa of Swedish birds.

HART (p. 616) examined the blood of birds in S. Carolina for parasites.

SERGENT and SERGENT (p. 448) have named a parasite of sparrows *Haemoproteus wenyoni*.

Charles Wilcocks

MALARIA

SHUTE, P. G. **A Review of Indigenous Malaria in Great Britain after the War of 1939-1945, compared with the Corresponding Period after the 1914-1918 War. (With some Observations of the Aetiology.)** *Monthly Bull. Ministry of Health & Pub. Health Lab. Service (directed by Med. Res. Council).* 1949, Jan., v. 8, 2–9, 4 maps.

This paper extends and amplifies the information contained in the author's previous paper [this *Bulletin*, 1948, v. 45, 21].

The distribution of cases of malaria in Britain before and after the first and second World Wars (up to 1948) are now shown on a county basis and are also shown in maps: a map showing the distribution of indigenous malaria about 1860 is also presented together with another indicating localities where conditions are favourable for the transmission of malaria. The distribution in 1860 corresponded closely with that of 1917–21.

It is noted that between 1917–21, the county of Kent accounted for 82 per cent. of the cases: in 1916, patients from Salonika with relapsing malaria were situated in a camp in the Isle of Sheppey, where *Anopheles maculipennis* var. *atroparvus* are very numerous. Cases of malaria occurred among the local population.

A dominant feature of malaria in England at that time was that many attacks occurred in the same street and, indeed, in consecutive houses.

During the second World War there were not as many cases on the Thames Estuary area as there had been between 1917–21.

The difference in the measures taken during the two periods is described and the value of DDT spraying and the new antimalarials after the second war is stressed.

The author shows from the figures and maps that just half the counties in England and Wales possess conditions at some time favourable for the full development of *P. vivax* and that potential vector mosquitoes are present in most parts of the country. The part played by local temperatures and the zoophilism of *A. maculipennis atroparvus* in restricting the spread of malaria in Britain is described, together with the habits and developmental requirements of the mosquitoes *A. m. atroparvus* and *A. m. messeae*. Because of the habits of the mosquitoes, the risk of spread of malaria in inland districts of Britain is slight, but under favourable conditions, cases may occur in low-lying coastal areas where *A. m. atroparvus* flourishes. Because of the domestic habits of these species, large scale anti-larval methods are usually unnecessary in Britain and house-spraying is more effective and economical. As indigenous malaria in Britain is caused almost entirely, if not solely, by *P. vivax*, and this parasite seldom survives in man for more than three years, it is unlikely that troops who had malaria up to 1945 and have returned home are now infective to local *Anopheles*.

The disappearance of endemic malaria from England (as distinct from sporadic imported cases) is probably due to (1) soil drainage in the latter half of the 19th century, (2) improved domestic hygiene, which has caused the local mosquitoes to become almost entirely zoophilic, (3) the introduction of anti-malarial drugs. *H. J. O'D. Burke-Gaffney*

SENIGAGLIA, A. La statistica della malaria in Italia nel biennio 1946–1947. [**Malaria Statistics in Italy in 1946 and 1947.**] *Ann. d. San. Pubblica.* Rome. 1949, Mar.–Apr., v. 10, No. 2, 404–21, 1 chart. English summary (7 lines).

Malaria statistics received by the High Commissariat for Hygiene and Public Health from all the Provincial Bureaux in Italy, for the years 1946 and 1947, are set out in a series of tables. They demonstrate the remarkable decline in malaria morbidity and mortality that characterized 1947. All regions and provinces participated in that decline to a greater or lesser degree. For Italy as a whole primary attacks of malaria notified fell from 38,123 in 1946 to 13,979 in 1947; relapses from 336,040 to 196,849; deaths from malaria from 280 to 93.

The factors which contributed to the lowered incidence are but briefly referred to: the paper is a statistical study. It may be recalled that the systematic use of DDT in malaria control in Italy began in 1946.

Norman White

MARCOVECCHIO, E. La lotta antimalarica nella Provincia di Verona nell'ottennio 1941–1948. [**Antimalaria Campaign in the Province of Verona 1941–1948.**] *Riv. di Malariologia.* 1949, June, v. 28, No. 3, 153–86, 2 graphs & 2 maps (1 coloured). [15 refs.] English summary.

This paper opens with the history of malaria incidence in the Province of Verona since the beginning of this century. In 1902 malaria was said to be endemic in 52 of its 112 communes; the total number of malaria cases recorded was about 13,000. An almost exactly similar incidence was recorded in 1913. Thereafter there was a remarkable and almost uninterrupted decline in malaria prevalence: the average annual incidence of malaria between 1924 and 1931 approximated 500 cases. Subsequent years showed an upward trend in the incidence curve which reached its summit in 1936, 1,500 cases. Each year since then has shown a decreasing prevalence. The total number of indigenous cases reported in 1941 (both primary infections and relapses) was 672. In 1948 only five primary cases and 49 relapses were recorded.

This decline in malaria incidence during the difficult war years is remarkable. Most if not all other malarious provinces in Italy suffered exacerbations of this disease. No DDT was used in the Province of Verona. The author claims that steady persistence in time-honoured methods of malaria control by members of his staff was responsible for the success achieved. *Norman White*

LEWIS, D. J. **Early References to Malaria near Dongola.** Reprinted from *Sudan Notes & Records.* 1948, v. 29, Pt. 2, 218–20.

WILSON, D. Bagster. **Malaria in British Somaliland.** *East African Med. J.* 1949, Oct., v. 26, No, 10, 283–91, 1 map.

A malaria survey of British Somaliland was made in May and June 1946 when part of that country was suffering from a severe epidemic of the disease. The inhabitants are Somalis, a Hamitic race of nomadic habits, and living in *Akhals*, fragile huts consisting of a stick framework covered with mats or skins. Their life is governed by their stock; their habits profoundly influence the type of malaria. For instance, when the rains have been heavy and have provided good grazing, the tribesmen will remain in the area for a long time and be exposed to the maximum chance of transmission. Usually malaria is related to localities; here it was necessary to find out where the people were living a month before the epidemic.

The country can be divided into four zones, the coastal plain and the central plateau where malaria is practically absent, the northern foothills where endemic malaria in small foci occurs following the breeding of *Anopheles gambiae* in the watercourses, and lastly the southern grazing areas lying below 3,000 feet. These last areas comprise the most important source of epidemic malaria in Somaliland. *Anopheles gambiae* breeds in the rainpans—hollows in the ground an acre or more in size, which collect water from the surroundings. Adults of the species appear about a month after the onset of rain in April to June, and the epidemic occurs a month later. Anopheline density per hut varied from below one to over 70, though the higher catches were exceptional.

In all, 1,300 spleen and 600 blood examinations were made. The parasite rate was 13 per cent., including 68 records of *P. falciparum*, eight of *P. malariae*

and two of *P. vivax*—half of all the infections being accompanied by gametocytes.

In the northern foothills, the spleen rates in children were 62 per cent., in adults 39 per cent.; the parasite rates were 21 per cent. and 9 per cent., with a reduced parasite infestation in adults. In the southern epidemic, the spleen rates were 30 per cent. in children and only slightly lower (22 per cent.) in adults, while the parasite rates were 10 per cent. and 6 per cent. respectively, accompanied by a high parasite infestation at all ages. These findings suggest the absence of much effective immunity. *P. C. C. Garnham*

Dy, F. J. **The Malaria Problem in the Philippines Today.** *J. Philippine Med. Ass.* 1949, July, v. 25, No. 7, 347–50.

This describes in general terms the very great importance of malaria as an economic and social problem in the Philippines today. The government appropriation for malaria control is totally inadequate, and most private companies, planters and other concessionaires are indifferent in the matter. The author pleads earnestly for a more active policy which would earn rich dividends. *Norman White*

Malaya, Federation of: **Annual Report of the Malaria Advisory Board for the Year 1948** [MacGregor, R. B., Chairman]. 19 pp., 6 charts & 1 map. 1949. Kuala Lumpur: Govt. Press. [$1.50 or 3*s.* 6*d.*]

The incidence of malaria in Malaya continues to show a steady decline, and the hospital admissions for this cause recorded in 1948 are only 69 per cent. of those in 1947, and about one-third of those in 1933, despite the increase in population which had occurred in the intervening years. Several alternative explanations have been put forward, including acquisition of immunity during the uncontrolled epidemics of the occupation, change in cultivation methods giving less encouragement to *Anopheles maculatus* on estates, cyclical changes and mass prophylaxis. None of these suggestions is supported by useful evidence.

There is a record of a small trial of prophylactic proguanil in a school, and it is said that much work is in progress to test the value of DDT for malaria control, but there is little to report at present. Five per cent. DDT in an oil with a good spreading pressure applied at the rate of half a gallon per acre, is quite an effective larvicide and is very economical on still water, but the same dosage on flowing water to control *A. maculatus* does not give satisfactory results. *G. Macdonald*

Bradley, G. H. & Goodwin, M. H., Jr. **Malaria Observation Stations of the Public Health Service.** *J. National Malaria Soc.* 1949, Sept., v. 8, No. 3, 181–91, 4 figs. [22 refs.]

Since 1935 there has been a sharp, uninterrupted decline in malaria incidence in the United States, but the disease still remains in a few endemic areas. A Malaria Investigation Station has been established in each of three areas representative of physiographic regions in which malaria was formerly highly endemic. Their function is to get early information of any recurrence of malaria that may occur, and to find explanations for malaria recession or recurrence should such occur.

The Mississippi Delta Station is in Phillips County, Arkansas. This County was formerly one of the five most malarious counties in the United States. The East Gulf Coastal Plain Station is in Baker County, Georgia. This area is

characteristic of the coastal limesink areas which have had more malaria than any other physiographic division of the United States. The third Station adjoins an artificial impoundment at Manning, South Carolina.

The East Gulf Coastal Plain Station started work in 1939. A population of about 1,000 in an area of about 40 square miles has been kept under close observation. Blood examinations of all persons with symptoms suggestive of malaria have been made. In 1939 and 1940 positive blood films were numerous ; in 1943 and 1944 they were excessively rare. In 1945 precipitin tests showed that less than 0·1 per cent. of *A. quadrimaculatus* had fed on man.

Similar observations by the Artificial Impoundment Station showed a similar decline in positive blood findings between 1944 and 1948. Here gland infections in both *A. quadrimaculatus* and *A. crucians* continue to be found. It is possible that the sporozoites in *A. crucians* are from an infection of a lower animal : the identity of these sporozoites has not yet been determined.

The Mississippi Delta Station has only recently been established. It has started work on lines similar to those of the other two. *Norman White*

DECOURT, P. Les stades exo-érythrocytaires du *Plasmodium* : la forme pré-schizontique (protozoïte) et la phase post-schizontique. Leurs rapports avec l'immunité. [**The Exo-Erythrocytic Stages of** *Plasmodium* : **the Pre-Schizont (Protozoite) and Post-Schizont Phases and their relation to Immunity.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 452–6, 1 chart.

The " French " conception of exo-erythrocytic schizogony in malaria is stated to differ so much from that held abroad, that it was considered desirable to present a summary of the " French " viewpoint :—

Period 1. Inoculation of sporozoites into skin.

Period 2. Division of nucleus of sporozoite (15 to 30 minutes) with formation of protozoites.

Period 3. The protozoites enter and multiply in various mononuclear cells of the connective tissue.

Period 4 (End of parasitological incubation period). The new protozoites invade the erythrocytes ; others re-enter tissue cells.

Period 5 (End of clinical incubation period). Multiplication of schizonts in the blood, with persistence of a few protozoites.

Period 6 (Development of immunity). Parasites diminish in number and gametocytes appear.

Period 7 (Febrile symptoms disappear). Some schizonts become " dysgonic ", *i.e.*, immobilized in a state just prior to division into merozoites. Others are captured by reticulo-endothelial cells of capillaries of various organs, *e.g.*, brain, where though they are not destroyed, their activity ceases.

Period 8 (Relapse). The dysgonic schizonts resume their activity and the reticulo-endothelial schizonts are liberated into the blood. The few remaining protozoites become transformed into blood parasites.

Period 9 (State of immunity-tolerance). As period 7.

Period 10. As period 8, with gradual complete disappearance of parasites.

[This conception conflicts with other views (*a*) in the initial development of the sporozoites, (*b*) in the behaviour of the schizont in the reticulo-endothelial system and (*c*) in the existence of " dysgonic " blood schizonts. While admitting that all the phenomena associated with avian malaria are not yet clearly understood, and that this conception might help in their clarification, it is impossible to fit it in with the known facts of mammalian malaria, where essential stages, pre-clinical and pre-relapse, are found in the hepatic parenchyma. It is also difficult to understand how the author reconciles his theory of the

static state of the avian parasite inside the reticulo-endothelial system with the appearance of *P. gallinaceum* so obviously active in the cerebral reticulo-endothelial system.] *P. C. C. Garnham*

SERGENT, Ed. Contribution à l'étude du second cycle évolutif insexué des *Plasmodium* chez les paludéens. [**Contribution to the Study of the Second Cycle of Plasmodium in Malaria.**] *Arch. Inst Pasteur d'Algérie.* 1949. Sept., v. 27, No. 3, 211–49, 29 figs. & 4 charts. [71 refs.]

Professor Sergent gives a clear historical account of exo-erythrocytic schizogony in malaria written in his inimitable style. The following parasites are briefly described: *Plasmodium relictum, elongatum, gallinaceum, cathemerium, circumflexum, lophurae, durae, mexicanum, cynomolgi, kochi, falciparum* and *vivax*. From an examination of the various types of development, some people have concluded that fusion of the two families, Haemoproteidae and Plasmodiidae was desirable; Edm. Sergent thinks the reverse, the presence of schizogony in the erythrocytes in the latter and its absence in the former constituting an all-important difference. The author studied exo-erythrocytic forms of *P. relictum* in canaries infected with this parasite. The strain was isolated in 1933 from an Algerian sparrow and was maintained entirely by blood passage in canaries kept under mosquito-proof conditions. Altogether, 247 birds were examined—not specifically for the presence of tissue forms, but more or less fortuitously, and 12 birds revealed exo-erythrocytic parasites. It is emphasized that such schizonts must produce not only haemotropic merozoites (=micromerozoites) but also histiotropic merozoites (=macromerozoites)—because of the absence of sporozoite transmission in this series. Some of these 12 infections were as early as 12 days, others as long as two and a half years. The exo-erythrocytic parasites were all found in monocytes in smears of lung, liver, spleen, heart, kidney, intestine, brain and bone marrow and were chiefly in the form of dark red (Romanowsky stained) angular merozoites 0·1 to 1·2 μ in diameter with no cytoplasm. No young forms were seen. It is suggested that during latent periods of the infection these forms in monocytes constitute the reservoir of the parasite.

[The paper is accompanied by numerous drawings in Indian Ink of intracellular parasites. These illustrations and the description in the text are unlike most of the exo-erythrocytic forms of *P. relictum* described by numerous observers (e.g., RAFFAELE, *Riv. di Malariologia*, 1936, v. 15, 309, 318). The usual forms are in fixed histiocytes; these are in wandering cells, stated by the author to be chiefly of the erythroblast type—in other words this strain of the parasite is behaving more like *P. elongatum* or *P. mexicanum*.]

P. C. C. Garnham

BALDI, A. Sul reticolocitotropismo del *P. vivax*. [**The Predilection of** *P. vivax* **for Reticulocytes.**] *Riv. di Malariologia.* 1949, Aug., v. 28, No. 4, 197–220, 8 graphs. English summary.

These observations were made on eight neurosyphilitic patients undergoing malaria therapy. Each was inoculated with the blood of a donor infected with Italian strains of *P. vivax*. Daily counts were made of reticulocytes and malaria parasites in the blood. In one case counts were made every six hours. The technique employed is fully described.

When the curve of parasitaemia attains its maximum it runs more or less parallel with the reticulocyte curve: in two cases they could almost be superimposed. When the curves are close together a fall in the number of

reticulocytes promptly follows schizogony and the attack of fever. When reticulocyte and parasite counts approximate each other multiple infection of red cells commonly occurs.

The observations favour the view that " reticulocyto-tropism " of *P. vivax* is an essential rather than a preferential phenomenon. *Norman White*

YOUNG, M. D. & EYLES, D. E. **Parasites resembling *Plasmodium ovale* in Strains of *Plasmodium vivax*.** *J. National Malaria Soc.* 1949, Sept., v. 8, No. 3, 219–23, 1 text fig. & 9 coloured figs. on pl.

Three strains of *Plasmodium vivax* were found to exhibit certain features characteristic of *P. ovale* during the course of their transfers in mental hospital patients. Such forms were seen on two or three occasions in the St. Elizabeth's strain over ten years ; in two out of 200 patients infected with the Chesson strain (obtained in 1944 from an infection contracted in New Guinea) and in nine out of 18 patients infected with the Pait strain (obtained in 1945 from a New Guinea infection showing ten or fewer merozoites per schizont). The *ovale*-like forms were seen chiefly at the crisis of parasitaemia, and were always followed or preceded by normal *vivax* parasites. Clinically, the infections resembled benign tertain malaria in their severity and tendency to relapse. Morphologically, the *ovale* forms were small, with eight or fewer merozoites, occupying enlarged cells often oval and with fimbriated ends and with prominent Schüffner's dots, while the trophozoites were not very amoeboid. The frequency distribution of the number of merozoites per schizont showed one peak only, indicating that a single infection was concerned.

[The authors rightly point out that the presence of abnormal forms in *P. vivax* infections must make one very critical of reports of *P. ovale* based upon isolated cases observed for only a few days. The authors have applied several criteria for the diagnosis of *P. ovale*, but have omitted the most essential one, *viz.*, the characteristic appearance of the pigment in the oöcyst. JAMES, NICOL and SHUTE's [this *Bulletin*, 1933, v. 30, 74] observations on this point finally clinched the validity of the new species.] *P. C. C. Garnham*

MATTINGLY, P. F. **Studies on West African Forest Mosquitos. Part I. The Seasonal Distribution, Biting Cycle and Vertical Distribution of Four of the Principal Species.** *Bull. Entom. Res.* 1949, May, v. 40, Pt. 1, 149–68, 6 figs.

" The present paper is the first of two dealing with the seasonal distribution hourly variation in biting activity, and vertical distribution of certain Southern Nigerian mosquitos. The technique employed in the studies under discussion resembled that used by Haddow (1947) in Uganda. Human bait was used in both cases and the agreement between the results obtained in the two localities is felt to be such as fully to justify the employment of such methods. Over fifty species of mosquitos were taken in all and fourteen of these proved to be sufficiently abundant to yield significant figures. Four of these are discussed and the remainder will be dealt with in the second paper.

" The most remarkable feature of the seasonal distribution was the very restricted period during which *Anopheles gambiae* was present in any abundance. This species occurred in large numbers only during the heavy rains of June and July and, to a less extent, in association with the small rains of September–October. During the dry season it almost disappeared. *Aëdes africanus* showed a similar distribution to that of *gambiae* but *Taeniorhynchus africanus* and *Anopheles hargreavesi* were most numerous during the dry season. It is

suggested that in the area under consideration the latter species may well be a more important malaria vector than *gambiae* owing to its greater abundance and more uniform seasonal distribution.

"As in Uganda *Aedes africanus* proved to be mainly a tree-top biter with a well-marked peak period of biting activity associated with evening twilight while *A. gambiae* and *A. hargreavesi* bit mainly on the ground and had their peak period in the morning. The biting cycle (hourly variation in biting activity) of *hargreavesi* showed considerable differences from that of *gambiae* but on analysis these proved to be superficial and to be due mainly to a difference of about one hour in the times of occurrence of their peak biting periods and a corresponding change in the vertical distributions with which these were associated. The occurrence of peak activity in the early morning in *A. gambiae* is considered to have an important bearing on the question of personal precautions against malaria.

"The biting cycle of *T. africanus* differed from that of any other species studied in that the period of peak activity occurred during the middle part of the night, the exact time varying quite widely on the various occasions on which observations were made. It is suggested that this may have been due to the occurrence of both morning and evening peak periods within the same species.

"Details are given of the variations in temperature and humidity encountered during the experiments together with meteorological observations made at a neighbouring airfield but a full discussion of the relation of these factors to the activity of the mosquitos is reserved for the second paper when all the data will have been presented."

BRISCOE, M. S. **Insect Reconnaissance in Liberia, West Africa.** *Psyche.* Cambridge, Mass. 1948, v. 54, No. 4, 246–55. [Summary taken from *Rev. Applied Entom.* Ser. B. 1949, Dec., v. 37, Pt. 12, 221.]

A list with locality records is given of insects collected in Liberia during a survey carried out throughout the year. The blood-sucking Diptera include *Glossina fusca*, Wlk., *G. nigrofusca*, Newst., *G. palpalis*, R.-D., nine Tabanids and 21 mosquitos. The species of *Anopheles* are *A. funestus*, Giles, *A. gambiae*, Giles, *A. hancocki*, Edw., *A. nili*, Theo., and *A. paludis*, Theo. *A. paludis* and four of the Tabanids are new records for Liberia.

TERZIAN L. A. & STAHLER N. **The Effects of Larval Population Density on some Laboratory Characteristics of** *Anopheles quadrimaculatus* **Say.** *J. Parasitology.* 1949, Oct., v. 35, No. 5, 487–95, 3 figs.

Studies were made of two series of laboratory colonies of *Anopheles quadrimaculatus*. Under-populated colonies contained an average of 150 larvae per pan, that is about one larva to each 2·3 square inches of water surface; over-populated colonies were those which averaged 1,500 larvae per pan or one larva to 0·2 square inches of water surface. The feeding of the larvae was adjusted so that the same quantity of food was available to each larva. All experiments began with newly hatched larvae and there was no significant mortality among them. The details of the experimental procedure are described.

Some observations which are frequently experienced by those who maintain laboratory cultures of *Anopheles* are confirmed by the results obtained in

these experiments. Overcrowding during larval development delayed pupation from a normal period of eight to ten days to ten to 20 days ; pupae from such colonies were smaller and lighter and as the developmental period lengthened more individuals died or failed to emerge from the pupal cases ; females which did emerge had lower biting rates and died sooner than those from the under-populated colonies. But it was also shown that the range of variation in the physical and physiological differences among the pupae and adults from overcrowded colonies was much greater than among those reared under the standard under-crowded conditions.

Finally, evidence is produced to show that copulation, rather than the mere presence of males, was a significant factor in stimulating the females to take a meal of blood; for while the biting rates of the females were lowest in those colonies having the lowest percentages of males and highest in those having the highest percentages, virgin females did not feed at all.

H. S. Leeson

PENN, G. H. & COLEMAN, S. A. **An Analysis of the Pupal Chaetotaxy of** *Anopheles quadrimaculatus* **(Say).** *Mosquito News.* 1949, Dec., v. 9, No. 4, 174–5, 1 fig.

LEVI CASTILLO, R. Los vectores de paludismo de los paises de la Costa Pacifica de America del Sur y su control. [**The Vectors of Malaria on the Pacific Slopes of South America, and their Control.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, July–Aug., v. 5, Nos. 7/8, 101–5, 1 fig. [21 refs.]

The author defines the general conditions under which the transmission of malaria can take place ; he then gives a brief but valuable account of the distribution of the disease in South America west of the Andes and of its transmission. He relates the epidemiology to the biology of the three species of *Anopheles* that are important. The paper forms a short, but valuable introduction to the subject and includes a selected list of references. *Anopheles albimanus* is the main vector of the coastal zone and generally occurs below 900 feet, though there are occasional records as high as 5,000 feet. One notes with interest that the egg is resistant to drying and that the insect passes through the rainless season in the egg stage in mud. In contrast with this *A. pseudopunctipennis* is not found at sea level, its range running apparently from about 300 feet above sea level to nearly 10,000 feet, though the distribution of the malaria by altitude is no doubt less than that. It breeds in clear water, often in water which is running. *A. punctimacula* lives between sea level and 5,000 feet, living in still waters among vegetation and often in association with rice. It is a rural insect, feeding on animals and only to a slight extent on man, but as it is often abundant it may be responsible for the transmission of malaria.

The control is discussed in relation to the biology of these species of *Anopheles*.

P. A. Buxton

EYLES, D. E. & JEFFERY, G. M. **The Experimental Transmission of** *Plasmodium falciparum* **by** *Anopheles albimanus.* *J. National Malaria Soc.* 1949, Dec., v. 8, No. 4, 344–5.

" A Panamanian strain of *Anopheles albimanus* transmitted two strains of *Plasmodium falciparum.* One strain of malaria was from the United States and one from Panama."

VARGAS, L. Caracteres morfologicos diferenciales de algunas pupas de Anofelinos neotropicales (*Diptera* : *Culicidae*). [**Differential Morphological Characters of Pupae of some Neotropical Anophelines.**] *Riv. di Parassit.* Rome. 1949, Dec., v. 10, No. 4, 231–5.

The English summary appended to the paper is as follows :—

" The pupae of *Chagasia bathanus* show a striking narrowing of the abdominal segments VI, VII and VIII that contrast with the progressive narrowing presented by the pupae of the genus *Anopheles*. *Chagasia bathanus* and the *Anopheles vestitipennis*, *gabaldoni* and *intermedius* differ from the pupae of other Anophelines described up to now by the brown-dark color of the paddles that contrast with the yellow-brown color of the body. In *Chagasia bathanus* the dark color extends to segments VII, VIII and IX. Distinctive morphological characters are given of the pupae of the neotropical *Anopheles vestitipennis*, *parapunctipennis parapunctipennis* and *hectoris*."

SASA, M. **I. Synoptic Table for the Identification of Japanese Mosquitoes by Larvae and Male Hypopygium.** *Japanese Med. J.* 1948, Dec., v. 1, No. 6, 530–34.

LUBITZ, J. M. **Pathology of the Ruptured Spleen in Acute Vivax Malaria.** *Blood.* Baltimore. 1949, Oct., v. 4, No. 10, 1168–76, 4 figs.

The author reviews published findings regarding pathological changes in the spleen in acute malaria and describes four cases in which splenectomy was performed for rupture, or threatened rupture, of that organ. All the patients recovered. The histopathology of the spleen in each case is described. There was cellular infiltration of the veins in all four. There was hyperblastic endothelium, obliteration and dilatation of sinuses. Reticulum hyperplasia, active germinal centres and dilated veins and venules were noted in all cases. Thrombosis and infarction was present in only one case. All four spleens had subcapsular haemorrhages.

This paper is summarized as follows :—

" Subcapsular haematoma precedes rupture.

" The capsular tear is an obvious consequence of the changes in the spleen occurring in acute malaria. Small haemorrhages occur in the vicinity of the capsule or deep in the tissues.

" A rapidly enlarging spleen with underlying vascular alteration predisposes to rupture. Minimal trauma may be a precipitating element.

" Diffuse cellular hyperplasia, subintimal and adventitial leukopoiesis, dilated sinuses and occasional thrombosis and infarction constitute the characteristic pattern in malaria.

" Changes in the left lung base may serve as a diagnostic aid in cases in which the diagnosis of splenic rupture is considered." *Norman White*

FIELD, John W. **The Microscopic Diagnosis of Human Malaria. Part I. A Short Descriptive Atlas of Thick-Film Diagnosis.** *Studies from Inst. Med. Res. Federation of Malaya.* 1948, No. 23, pp. vi+117, 67 figs. & 14 pls. (1 coloured). 1949, Kuala Lumpur : Govt. Press.

The preface to this book at once attracts the reader who has had practical experience of malaria in the field. There can be few such workers who have not encountered capricious staining, artefacts, and unfamiliar forms of the malarial parasites in the thick blood film, and there must be few people who would not welcome such a book as this which will save them months of struggling with new standards and puzzles. Now at last is available a study which sets out to " reduce the hazards of thick-film preparation and staining to a minimum ".

The material is entirely Malayan, but the morphology of the malaria parasites must be about the one facet of malariology which is uninfluenced by local conditions, and these descriptions of the parasite are probably of world-wide application. It is therefore unfortunate that no description of *P. ovale* is included ; the thick film diagnosis of this species is beset with greater difficulties than those of the three common ones, and perhaps the author is doing wisely in omitting *P. ovale* here ; it is hoped he will include it in the companion volume dealing with thin films which he plans to produce.

The book is divided into three main sections, the zoological position of the plasmodia, the description of the organisms in thick films, and technique.

The biological side is dealt with adequately, and is well illustrated by a number of schematic figures and tables. It includes an analysis of the tissue phase. Table 2 shows by the use of both Roman type and italics respectively, what is hypothesis and what is known ; there is still a lot of the former, for instance the author accurately refers to the development of the sporozoites of *P. vivax* in the liver as still hypothesis, though the presence of large schizonts on the seventh day after the inoculation of sporozoites he recognizes as fact. On other subjects too, he is equally critical, for instance in regard to the exact relationship of the parasite to the erythrocyte ; is it on the outside or the inside ? From his frequent allusion to this point, it would appear that he regards the former as being more probable. This section gives useful information about the blood cycles of the three human species, particularly valuable being charts and tables showing the hourly distribution of the stages of the parasite and also the levels of parasitaemia based on thousands of cases. It is interesting to note that mature schizonts of *P. falciparum* were found in the peripheral blood in 78 out of 2,316 cases, some of which were clinically mild.

The main portion of the book is devoted to the morphological appearances of *P. vivax*, *P. malariae* and *P. falciparum* in lysed and stained thick films, and is largely a summary of papers published by FIELD and LE FLEMING [see this *Bulletin*, 1940, v. 37, 56, 739 ; 1941, v. 38, 501]. It is illustrated by numerous figures in the text, and by 14 plates, the first of which is coloured, the others monochrome. Even the latter plates are remarkably realistic. Each plate is faced by a key, clearly lettered to show the different forms of the parasite. For diagnosis of species, the author states that it may be necessary to make a second examination of the blood, six hours after the first, especially when the parasites are limited to early trophozoites and are few in number. Illustrations are given of aberrant forms of *P. vivax* which approach *P. ovale* in appearance. These compact forms were common during the second world war in starved prisoners, and it is suggested that they are the result of some nutritional deficiency. Emphasis is laid upon the peculiar rounding up of *P. falciparum* gametocytes which occurs in slowly drying thick films—these forms are very unlike crescents and are usually mistaken for quartan gametocytes. [This is a common effect in other parts of the tropics also ; a correct diagnosis can usually be made by examining the edge of the film, where drying has occurred more quickly and where the gametocytes retain their crescentic form.]

The remainder of the book is occupied by information about technique. The original discovery of Romanowsky is described briefly—how the Russian worker prepared an eosin-methylene blue solution from materials which had become mouldy with age and thus contained the vital azure. It is this substance which either mordants the nuclei for subsequent staining with the eosin or stains them directly, and thus provides the essential colour contrast lacking in all former stains. The azure today is provided by more direct methods of polychroming. A very clear description of the mechanism of Romanowsky stains is given, showing how the combined radicles are dissociated in water with a *p*H of 7·0–7·2

to give the necessary range of colour. The introduction of buffer solutions has facilitated this result. Artefacts are well described : they are either unavoidable like groups of blood platelets, or avoidable like débris of all sorts. The latter can be prevented by observing scrupulous cleanliness (cleanse the finger, clean the slide, protect the drying film from dust and insects). It is important to dry the film well before staining—say after 12 hours, and the author states that the films must be stained within a few days. [Elsewhere in the tropics, the reviewer has kept thick films for more than a month and then effected successful staining.] Three methods are described in detail—Giemsa's stain (giving the best results), the rapid buffered isotonic Romanowsky (devised by the author) and the rapid J.S.B. In the last method the period of immersion in the polychrome methylene blue is incorrectly given as 10 seconds instead of 30. A neat demonstration of the effect of concentration (about 16-fold) in a thick film is described [as repeated by SHUTE (*Trans. Roy. Soc. Trop. Med. & Hyg.*, 1950, v. 43, 364)].

The book contains a small number of minor misprints. In the glossary, the zygote is described as being " the female gametocyte after fertilisation." It is the gamete which undergoes fertilisation—the gametocyte is the earlier immature stage.

This study will be indispensable to all laboratory and field workers in countries where malaria exists. *P. C. C. Garnham*

FISCHER, O. Über Ergebnisse von Sternalpunktionen bei Malaria. [**The Results of Sternal Puncture in Malaria.**] *Klin. Woch.* 1949, Apr. 1, v. 27, Nos. 13/14, 235.

The author investigated the value of sternal puncture as a method of diagnosis of benign tertian malaria when there were no discoverable parasites in the peripheral blood. He hoped that parasites might be present in the sternal marrow smear in the quiescent periods between relapses. He examined marrow in 16 cases treated with 300 mgm. atebrin [mepacrine] daily for seven days, followed by 30 mgm. plasmoquine for three days. Marrow was examined three days after the disappearance of parasites from the peripheral blood. In one case gametocytes were present, in two there were a few ring forms but in all other preparations no parasites were found. To counter the argument that the treatment given had in fact produced radical cure which would account for the disappearance of parasites from both blood and marrow, further cases were given smaller doses of both drugs and sternal marrow was examined two to three days after the disappearance of parasites and again a week later. No parasites were found. These cases relapsed 11 to 28 days after treatment. Those who showed parasites in the peripheral blood irregularly during the quiescent period did not show them in the sternal marrow.

After discussion of possible errors in the identification of malaria parasites in marrow, the author concludes that sternal marrow examination is of no help in diagnosis if the blood examination is negative, and consequently of no value so far as prognosis of relapse is concerned. *B. G. Maegraith*

APARICIO GARRIDO, J. Contribución al estudio de la reticuloendoteliosis paludica. Las alteraciones del mielograma en el paludismo por " Plasmodium vivax ". [**Alterations in the Myelogram in *P. vivax* Malaria.**] *Med. Colonial.* Madrid. 1948, Dec. 1, v. 12, No. 6, 361–79, 3 figs. [28 refs.] English summary.

In 50 patients infected with *Plasmodium vivax*, increase of cells of the reticuloendothelial system was observed in all stages of the disease.

The findings are shown in a number of tables and curves.

H. J. O'D. Burke-Gaffney

MÉCHALI, D., RODIER, J. & MALLET, R. La cholinestérase sérique dans le paludisme aigu. [**Serum Cholinesterase in Acute Malaria.**] *Bull. Inst. Hyg. Maroc.* 1948, v. 8, 121–3.

Many workers have shown that serum-cholinesterase levels are lowered in liver affections in proportion to the gravity of the lesion.

The authors studied the serum-cholinesterase levels of 50 Moroccan patients with proved malarial infections, either relapses or re-infections. The infections were caused by *P. falciparum* (20), *P. vivax* (20) and *P. malariae* (10). The attacks lasted for a few days (commonly) to more than a month in some cases. In addition 50 adult Moroccans in apparently good health were similarly examined.

Titrations were made by Stedman and White's technique, modified by Vincent, Ségonzac and de Prat.

The average serum-chloinesterase levels in the 50 healthy subjects was 3·86, which is lower than that found in adult Europeans (usually taken to be 4·5). It is possible that local nutritional factors and undetected clinical affections may have accounted for this difference. In any case since these factors might also be expected to exist in the case of those affected by malaria, the figure of 3·86 might reasonably be taken as a working standard. The results, which are shown in a table, were as follows :—

		Average level of cholinesterase	Per cent. below 3·86	Per cent. below 2·5
All cases	(50)	3·16	78	24
P. malariae	(10)	2·61	80	60
P. falciparum	(20)	3·09	80	30
P. vivax	(20)	3·50	75	0

Another table shows that in 13 *P. falciparum* infections the serum-cholinesterase level was 3·24 when the attack lasted less than 15 days and in seven in which the attack lasted from 15–30 days it was 2·82. Similarly five *P. malariae* infections lasting less than 30 days gave levels averaging 2·83 and five lasting longer gave an average of 2·39. The number of *P. vivax* infections lasting longer than 15 days was too few to allow of analysis.

It is concluded that serum-cholinesterase is reduced in acute malaria, but in general the reduction is slight (the level averaging 82 per cent. of normal). There is, however, a species difference, since the average level was 90 per cent. of normal in *P. vivax,* 80 per cent. in *P. falciparum* and 67 per cent. in *P. malariae* infections. On the other hand, the percentage of cases where the cholinesterase level was below 2·5 was 60 per cent. in *P. malariae* infections and 30 per cent. in *P. falciparum.* In all *P. vivax* infections, it was above 2·5.

It is also concluded that the level is increasingly lowered in proportion to the duration of the attack. *H. J. O'D. Burke-Gaffney*

HENRY, M. Hémozoïne artificielle et paludofloculation. Préparation du réactif, principe de la méthode. [**Artificial Haemozoin as a Reagent in the Flocculation Reaction for Malaria.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 267–78.

This paper describes the preparation of suspensions of a pigment which the author regards as very similar to, if not identical with, haemozoin, the

composition of which is still, according to him, undecided. The pigment is prepared by the oxidation of haemolysed blood by hydrogen peroxide. Its chemical properties closely resemble those of haemozoin ; in alkaline solution it gives the spectrum of alkaline haematin, and that of haemo-chromogen on the addition of a reducing agent. Analysis indicates that it is a combination (by adsorption) of denatured albumin and haematin.

A reagent can be made from the pigment which can be substituted for "*melanine ferrique*" in the author's serological flocculation reaction for malaria. The results obtained with the two methods are very similar. *B. G. Maegraith*

ZIPF, H. F. Ueber das Wesen und den klinischen Wert der Melanin-Serum-Reaktion von Henry (Modifikation nach Trensz). [**The Nature and Clinical Value of Henry's Melanin-Serum Reaction (Trensz's Modification).**] *Ztschr. f. Hyg. u. Infektionskr.* 1948, Aug. 17, v. 128, Nos. 3/4, 255–73, 7 charts. [47 refs.]

The author has compared the melanin-serum reaction (MSR) (Henry's flocculation test modified by Trensz) with the lability of the same sera in distilled water. He finds that the melanin-serum reaction is simply a sensitive index of lability in distilled water of serum from malaria cases.

For quick diagnosis of malaria a single reaction is insufficient : a rising curve is, however, a great help in diagnosis.

The MSR is of more use as an indication of the behaviour of the body defence mechanisms than as a diagnostic test. The reaction depends on increase in euglobulin associated with immunity processes. It is not specific to malaria and is thus positive in other conditions. *B. G. Maegraith*

HORMANN, H. Eine Methode zum serologischen Nachweis der Malaria. [**A Serological Method for the Diagnosis of Malaria.**] *Ztschr. f. Imunitätsf. u. Exper. Therap.* 1949, v. 106, 135–41.

The author has examined the significance of the serum-flocculation methods of Trensz and of Henry in the diagnosis of latent malaria. Technical details of the preparation of solutions and methods of titration for both tests are given in detail.

Results described in this paper and elsewhere indicate that these serological reactions are of more value in determining the immunity responses of individual subjects than in the diagnosis of malaria.

The author discusses the formation of the protein fractions concerned in these reactions against the background of tissue reaction to blood and tissue phases of malaria parasites. On the whole the serological reactions parallel splenic and parasitic indices, but in some chronic cases the reactions may be positive although the spleen is not palpable ; this is interpreted as an indication that splenic enlargement is not always a reliable indication of the development of immune bodies. *B. G. Maegraith*

SCHNEIDER, J. & HARTMAN, L. Explorations fonctionnelles hépatiques au cours du paludisme. Étude systématique au cours du paludisme d'inoculation. [**Systematic Tests for Liver Function during Inoculation Malaria.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 259–63.

Two strains of *P. vivax* were given by blood passage to eleven neurosyphilitics. One strain had been in constant use in the Beaujon hospital and the other was provided by P. G. Shute from Horton. Except in one case, ten to twelve rigors were allowed.

Certain biochemical changes and reactions in the blood were examined before the attack, during the incubation period, during the attack, and after treatment. Examinations made were as follows : total and ester cholesterol ; total protein ; globulin fractions (partly by electrophoresis) ; thymol turbidity ; cephalin : cholesterol flocculation. The authors regard these observations as tests of liver function, a point which is queried in the discussion by Ph. Decourt.

Representative results are shown in tables in the text. After the 5th or 6th rigor there was an increase in thymol turbidity ; total cholesterol fell, the ester fraction falling fast and sometimes being practically absent ; the cephalin : cholesterol reaction became strongly positive. There was a fall in total protein, mainly due to a reduction of albumin ; globulin values rose. The albumin/globulin ratio was consequently changed from normal.

All these returned to normal shortly after treatment of the malaria, mostly by the third week. The cephalin : cholesterol reaction took the longest to return to normal.

The authors claim that their results indicate a true liver dysfunction which is induced by malaria and is transitory and reversible.

Decourt, in an interesting discussion on the note, states that Henry's reaction would have shown a remarkable parallel to the authors' results. In inoculated malaria, after the 5th or 6th rigor, this reaction becomes increasingly positive and then diminishes rapidly after treatment, disappearing after some months. Henry's reaction is caused by non-specific modifications of plasma protein and should therefore be considered as a test for hepatic function rather than as a serological test specific to malaria. In Decourt's view these tests were not only liver tests but were dependent also on other organs. He suggested the term "*hépato-spleno-sanguine*" to cover them.

B. G. Maegraith

v. Haller, E. Gesetzmässigkeiten im Auftreten von Malaria tertiana-Erkrankungen. [**Regularity in Attacks of Benign Tertian Malaria.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 162–70. [Numerous refs.]

The author outlines the literature on the factors concerned in establishing the length of the incubation period, and the interval between the primary attack and relapse in benign tertian malaria.

Figures obtained by the author when working with prisoners in Italy during the war showed that for the strains he investigated, the ratio of the number of primary attacks resulting from infection in the previous year to relapses from similar infections was 1 to 2. This was the reverse of the situation in Holland recorded by Gill, but was similar to other authors' experiences of benign tertian malaria in Russia, E. Prussia and Spain. The figures indicate essential differences in strains of *P. vivax* in different countries and climatic zones. These time relations of strains are probably inherent in the parasites themselves and are not influenced by changes of environment, the season of biting and infection, etc.

The author gives details of observations over periods of 14–21 months on persons infected by mosquito bites with the same strain of *P. vivax* (5 healthy volunteers, 3 patients treated with malaria). The strain was obtained in 1946 from a prisoner of war who had contracted the disease in Russia. The author concludes that the time relations of this strain are fixed. The number of clinical attacks is closely related to the intensity of the original infection and the degree of bodily resistance produced. If the clinical attacks are treated promptly so that no appreciable immunity can develop it is possible, in a given

strain, to give an estimate of prognosis with regard to further relapses. The author supplies a table for this purpose for the strain he used.

B. G. Maegraith

HORMANN, H. Über die Inkubationszeit bei der Menschlichen Malaria. Eine epidemiologische Studie. [**On the Incubation Period in Human Malaria.**] *Klin. Woch.* 1949, Mar. 1, v. 27, Nos. 9/10, 153–8, 6 figs. [33 refs.]

This is a *Festschrift* paper in honour of Professor Rodenwaldt's 70th anniversary of his birth. The author indicates how difficult it is to determine nearly accurately the incubation periods of the different forms of malaria as variable factors are neither small nor few—the type of parasite, the number and vitality of the sporozoites injected, the individual resistance, and so forth. He adduces evidence from many districts, Berlin, Schleswig-Holstein, Bernau, Frankfurt-am-Oder, Westphalia and elsewhere, giving the returns of autochthonous cases, of those contracted elsewhere, and of relapses for different months of several years—a painstaking study but not amenable to abstract. Advantage was taken of the epidemic in Germany in 1945–47 and the recent knowledge of the pre-erythrocytic stages in the tissues to throw light on the different periods of incubation. In untreated malaria tropica (subtertian) the latent incubation period is short, from 6 to 17 days, presumably depending on the fact that the tissue development period (the exoerythrocytic stage) ends with the appearance of the blood forms. By experimental infection with *Anopheles* the quartan parasite has produced an incubation period of 24 to 42 days, but it must be remembered that acquired quartan infection may exist, symptomless, for years, so we must acknowledge that there may be a preponderating presence of exoerythrocytic forms and only occasional extrusion into the blood-stream. There may be similar limits in benign tertian, from a few days (9) to over a year. The views of Dutch investigators on the type occurring in northern Europe with long latency after infection in the autumn could not be confirmed by observers during the post-war epidemic in Germany. [Due acknowledgement is made to the work of British malariologists, a courtesy rarely accorded by German authors.]

H. Harold Scott

FISCHER, O. Ueber Dauer und Verlauf der Kriegsmalaria. [**The Duration and Course of Wartime Malaria.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 171–8.

The author gives details of an enquiry carried out in an internment camp in 1947 into the incidence of malarial attacks in persons who had left the endemic area. Three groups of patients were considered ; *i.e.*, subjects who had acquired malaria during the recent war, during the first World War and during the inter-war period. In the first group, about two-fifths (of 68 subjects infected with *vivax* malaria) had their last attack before leaving the endemic area and nine-tenths within a year of leaving the endemic area. Only three benign tertian relapses occurred after one and a half to two years. The number of relapses in individual cases of *vivax* malaria varied from one to twelve. All (9) subjects infected with *falciparum* malaria had their final clinical attack within six months of leaving the endemic area. The figures for the other groups were not very reliable but showed similar tendencies. The final relapse of *falciparum* malaria occurred in all cases within six months of leaving the endemic area.

B. G. Maegraith

DE GRAAF, W. **Relapsing Malaria.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, Sept., v. 1, No. 3, 282–8.

The Mater Dolorosa Hospital, Weltevreden, Batavia, was opened in 1942 for the reception of sick prisoners of war and a large number of malaria patients were admitted. This gave an opportinity for the study of malaria relapses unusual in the tropics, for Weltevreden at that time was free from indigenous malaria.

During 3 years 654 patients with malaria were treated. One group, mostly Australians, came from Timor, nearly all suffering from relapsing *vivax* malaria : they numbered 71. A second group of 300 Dutchmen were brought from the island of Flores where they had suffered much privation and where many of their compatriots had died from untreated malaria : their infections were also mostly *P. vivax*. The remaining 283 patients (193 *P. vivax*. 64 *P. falciparum*, 19 *P. malariae*, 7 mixed) had been infected in different parts of the archipelago. The Timor patients relapsed more frequently than those in the other groups.

Of the early *P. vivax* relapses, 72 per cent. occurred within one month and 93 per cent. within 2 months after treatment. The number of relapses decreased sharply after the 8th week ; the peak occurred in the 3rd week.

For treatment most patients received quinine. One hundred and six had a five-day course of quinine ; 1·2 gm. daily, followed by plasmoquine hydrochloride 20 mgm. thrice daily for five days. The relapse rate following this treatment was not significantly lower than that of a comparable group of 107 patients who had no plasmoquine.

No relapse was seen in any patient who had been away from an endemic area for more than 18 months.

To suppress relapses a five-day course of quinine treatment, 1·2 gm. daily, repeated every 3 weeks, was satisfactory. [See also this *Bulletin*, 1949, v. 46, 901.] *Norman White*

COOPER, W. C., RUHE, D. S. & COATNEY, G. R. **Studies in Human Malaria. XVI. Results of Massive Subinoculation during Latency from Patients infected with St. Elizabeth Strain Vivax Malaria.** *Amer. J. Hyg.* 1949, Sept., v. 50, No. 2, 189–93, 1 fig.

Six volunteers were each infected by the bites of 10 *Anopheles quadrimaculatus* infected with the St. Elizabeth strain of *P. vivax*. Two of them had their early primary attacks terminated with chloroquine ; two had had early activity completely suppressed with chloroquine ; two had had early activity suppressed with SN 6771. The blood of each of them was transfused to another susceptible volunteer. At the time of these subinoculations six months had elapsed since the donors were infected and all of them were free from signs or symptoms of malaria. The amount of blood transfused in each case was 250 ml. ; sodium citrate was used as an anticoagulant. Only one of the six recipients developed malaria ; the donor in his case was on the verge of a late relapse, patent parasitaemia developing seven days after the blood transfer. On the 103rd day after the transfusions the five other recipients were each inoculated with 100,000 St. Elizabeth strain *vivax* parasites : all developed acute attacks of malaria within 7 days.

A second similar experiment was made with four other volunteers with similar results.

It would seem that malaria parasites in the fixed tissues only periodically release forms which invade the erythrocytes. Negative subinoculation is no

evidence of cure in *vivax* malaria. All the donors in these experiments subsequently exhibited late attacks of malaria at the expected time.

Norman White

KLINGER, W. Milzexstirpation und Malaria. [**Extirpation of the Spleen and (its Effect as regards) Malaria.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 195–201. [10 refs.]

Splenectomy is usually undertaken in tropical countries on account of rupture in chronic malaria. The author had the opportunity of observing a patient who, as the result of a bomb, sustained a wound which completely destroyed (*völlig zerrissen*) his spleen ; the remnants of the organ were removed a few hours later. In the course of transfer home to Germany he passed through malarious countries and a month after the injury he suffered from fever and signs typical of malaria ; *P. vivax* schizonts and gametocytes were seen in his blood. He was treated with atebrin [mepacrine] for a week without benefit, and later with quinine and injections of glucose in saline. The fever dropped and parasites were no longer seen. Six weeks later he had a return of the attacks and the parasites were again found in his blood, ring forms, half-grown forms and gametocytes. He was given Sontochin R 0·3 gm. and plasmoquine 0·01 gm. twice daily. After 3 days the former alone was given ; the blood appeared parasite-free and has remained so. It is still to be seen whether more relapses occur, but the author concludes that in splenectomized persons the infections acquire definitely increased virulence. He quotes RUSSELL, WEST and MANWELL as saying : " The practical question whether a man who has had his spleen extirpated runs a greater risk or not in a malarious region is not easy to answer because the evidence for and against is scanty and to a certain extent contradictory " [these may not be the actual words in their book because the quotation is given in German which the abstracter has translated].

H. Harold Scott

JAYAWARDENE, M. D. S. **Analysis of 900 Cases of Malaria among the Ceylonese Troops during the War.** *J. Ceylon Branch Brit. Med. Ass.* 1949, Apr., v. 44, No. 2, 21–4, 4 charts.

During the three years 1943–45, 5,588 cases of malaria were treated in the Ceylonese Military Hospital. Of these 900 were looked after by the author. The heaviest incidence of malaria was during the first five months of the year and in December. The percentage incidence of parasite species in these 900 cases was *P. vivax* 56·7, *P. falciparum* 30·6, *P. malariae* 4·6, mixed infections 2·4 (clinically diagnosed 5·4).

Information is given about the occurrence of rigors, red cell counts and blood sedimentation rates in these cases. The most important complications noted were bronchitis, bronchopneumonia and jaundice, apart from anaemia and cachexia. Most cases were treated with quinine.

Norman White

THIODET, J. & FOURRIER, A. Trois cas d'accès pernicieux palustres à *Plasmodium vivax*. [**Three Cases of " Pernicious "** *Plasmodium vivax* **Infections.**] *Algérie Méd.* 1949, Apr., No. 4, 159–62.

The authors quote three cases in Algeria (all Africans) where pernicious attacks of malaria were attributed to *P. vivax* : two were fatal.

In the first, the patient (aged 20) was semi-comatose on admission. He had suffered from violent febrile attacks for about 10 days, then became disorientated. On admission, he was very ill, with pulmonary signs. As malaria

was then prevalent, it was assumed that this was an attack of " pernicious malaria " and treatment was given without the laboratory report being awaited. This later showed a blood smear full of *P. vivax* in different stages. The patient was given intravenous quinine and cardiac tonics, but died in coma and with hyperpyrexia on the 4th day.

The second patient, aged 39, had suffered from febrile attacks and jaundice for 15 days : he then fell into coma. He was very ill, dehydrated and showed meningeal signs, but his temperature was subnormal on admission. Numerous *P. vivax* were found in blood smears. The spleen was not palpable. The patient was treated on the same lines as the first. He improved rapidly, coma disappeared on the 4th day and he had fully recovered in 15 days.

The third patient was an unidentified boy of 14, who was found crying and delirious in the street. He became comatose and pyrexial. The spleen was somewhat enlarged. There were a few *P. vivax* in the blood. He was treated like the others, but died unconscious and hyperpyrexial on the 3rd day.

The authors point out that these cases suggest that the gravity of a pernicious attack of malaria is not necessarily associated with parasite density (there were only a few in case 3) nor with raised blood urea (which was highest in the patient who recovered). Again, the first patient, who was semi-comatose, died while the second was completely comatose but recovered. A rising temperature in these cases is a bad prognostic sign. The authors conclude that " pernicious " attacks of malaria may be caused by *P. vivax*.

H. J. O'D. Burke-Gaffney

THIODET, J. & FOURRIER, A. Sur un asthme d'origine palustre guéri par la quinine. [**Asthma of Malarial Origin cured by Quinine.**] *Algérie Méd.* 1949, Apr., No. 4, 162–4.

An African of 35 suffered from severe asthmatic attacks for 5 days. On admission, his temperature was 104°F., but the spleen was not enlarged. Several forms of treatment were administered and periods of relief were obtained, but the distress continued and attacks continued to occur. By the 10th day, despite all treatment, the dyspnoea increased and the temperature became high. On the 12th day, a blood smear was examined, and was found to be full of *P. vivax*. Intramuscular quinine was given, with dramatic results : the temperature fell to normal in 48 hours and the dyspnoea disappeared. Quinine was continued and the patient became fully cured. The authors consider that this case supports the " anaphylactic theory of the malarial attack " [see also this *Bulletin*, 1949, v. 46, 215].

H. J. O'D. Burke-Gaffney

MOHAPATRA, G. S. **Toxic Manifestations of Malaria.** *Indian Med. Gaz.* 1949, Sept., v. 84, No. 9, 394–5.

This paper records the case of an Indian boy of 11 with a quotidian fever of a week's duration, accompanied by troublesome itching and urticarial eruptions all over the body : these subsided daily with the remission. On the 5th day, partial paralysis of the soft palate was noted, and this produced defects in speech and deglutition. Anaemia was present and the spleen was enlarged. The blood smear showed a fair number of *P. vivax*, but no *P. falciparum* were found despite repeated examination. There was an eosinophilia of 15 per cent. The patient responded rapidly to paludrine [proguanil] and on the third days fever and urticaria had disappeared. The recovery from the partial paralysis of the soft palate was gradual and was not complete for two months.

The author discusses briefly the toxic basis claimed for such manifestations, which he suggests cannot possibly be explained in this case without recognition of a "malaria toxin". Before these manifestations are attributed to a "malaria toxin", more evidence would be required, particularly as regards elimination of other factors and interpretation of existing ones, *e.g.*, the presence of 15 per cent. eosinophilia.] *H. J. O'D. Burke-Gaffney*

RANSOME, G. A. **Notes on the Management of Cases of Cerebral Malaria.** *Proc. Alumni Assoc. King Edward VII College of Med.* Singapore. 1948, Oct., v. 1, No. 1, 23–8, 1 diagram.

These notes are the outcome of the experience of a team of workers who treated 170 cases of fully developed malarial coma on the Assam-Burma Frontier during 1943 and 1944.

In a hyperendemic area cases of malaria should be watched for signs of developing coma: common signs are changes in mood, mental clouding, non-purposive actions and bed-wetting.

If coma develop and the systolic blood-pressure is over 100 mm. Hg, and the pulse volume good, quinine should be given intravenously, 6 grains, at the rate of 1 grain a minute. This can be repeated every six hours (or every four hours for a heavy man or a heavy infection) and continued for 48 hours or until the patient is out of coma, whichever may be earlier. If the systolic blood-pressure be below 100 mm. Hg and the pulse-volume poor, intravenous saline should be given, rapidly at first, and 6 grains of quinine added to the last half pint injected. Plasma is ideal. The author states that the patient should be "prone with one pillow . . . foot of the bed raised if necessary."

Transfusion of fresh whole blood is indicated in severely anaemic patients or heavy infections.

As soon as circulation is satisfactory patients should be nursed in Fowler's position.

Ryle's tube may be passed through the nose into the stomach, through which quinine, sedatives, fluids, alkalies and salt may be given. Altogether 52 grains of quinine may be given in the first 24 hours (including intravenous quinine). Absorption is controlled by the Tanret test.

Maintenance of a clear airway is essential: cyanosis from respiratory obstruction must be avoided at all costs.

Restlessness, fits and convulsions must be rigidly controlled. Pentothal sodium (intravenous) was found satisfactory, supplemented by oral paraldehyde or intramuscular luminal sodium.

Central cardiac failure can be treated with strophanthin grain 1/60 intravenously, repeated after 18 hours if necessary. Peripheral failure and oliguria may be treated with caffeine sodium benzoate 7½ grains every six hours in addition to intravenous infusion.

If late cerebral oedema develop lumbar puncture should be repeated; dehydration of the brain with concentrated solutions of glucose or plasma may be tried. *Norman White*

WINCKEL, C. W. F. Note sur la dose de quinine à administrer dans le paludisme aigu. [**The Dose of Quinine to administer in Acute Malaria.**] *Rev. Paludisme et Méd. Trop.* 1949, Nov. 15, v. 7, No. 66, 239–50.

The author comments at length on the remarkable diversity of opinion that still exists as to the appropriate daily dosage of quinine in the treatment of acute malaria. Doses recommended by 42 authors are tabulated: they vary from 0·5 to 2·5 gm. of the alkaloid a day. In certain countries the tendency to

increase the dose has been specially noteworthy since 1943. Most of the advocates of very high doses fail to substantiate their necessity. Theoretical considerations and practical experience alike favour the administration of small doses. It is very desirable that the optimum dose should be fixed, taking into consideration any particularity of the local strains of *Plasmodium*. In certain countries the use of quite small doses has resulted in more rapid alleviation of symptoms, fewer symptoms of cinchonism, and considerable economy. *Norman White*

COATNEY, G. R., COOPER, W. C., RUHE, D. S. & YOUNG, M.D. **Studies in Human Malaria. XVII. Trials of Quinacrine, Colchicine (SN 12,080) and Quinine against Chesson Strain Vivax Malaria.** *Amer. J. Hyg.* 1949, Sept., v. 50, No. 2, 194–9, 1 fig. [12 refs.]

This is a further report of drug testing experiments carried out at the Atlanta Penitentiary [see this *Bulletin*, 1949, v. 46, 1004]. The procedures adopted have been described in previous publications. In the trials now reported the Chesson, a New Guinea, strain of *Plasmodium vivax* was used.

Three volunteers were given quinacrine [mepacrine] hydrochloride for 4 days before, on the day of, and for 6 days after infection by the bites of ten infected *A. quadrimaculatus*. The dose was 0·8 gm. on the first day, and 0·4 gm. on each of the succeeding 10 days, in divided doses. A second group of 3 volunteers were given similar daily doses but they were continued for 20 days after infection. A third group of 3 volunteers served as untreated controls. Two of the 3 subjects on the 4–1–6 regimen developed malaria 50 and 83 days after infection; two of the 3 on the 4–1–20 regimen developed malaria 107 and 108 days after infection; the 3 controls developed malaria 13 to 15 days after infection.

All attacks of malaria in these 9 subjects were treated with quinacrine, 2·8 gm. in 6 days. Intervals to relapse after such treatment were very variable; the median interval from treatment to relapse was 50·5 days.

Four volunteers were given colchicine, 0·0005 gm. every 8 hours on the day of and for 6 days after the day of infection. Two other volunteers were untreated controls. All 6 subjects developed acute attacks of malaria 11 to 12 days after infection. These attacks were treated in 3 subjects with quinine 2 gm. a day for 6 days followed by 1·5 mgm. colchicine a day for 6 days. The 3 other subjects were treated with quinine alone. All six subjects subsequently relapsed. Those treated with quinine alone had several relapses in close succession, the interval from treatment to relapse being from 9 to 20 days. Those given colchicine had only 1 to 3 relapses each. (The 3 subjects treated with colchicine were infected by a different batch of mosquitoes from those which infected the quinine-treated subjects.)

The Chesson strain of *P. vivax* behaves quite differently from the St. Elizabeth strain, with which previous similar experiments were carried out. After protective courses of quinacrine, such as those described above, primary attacks of St. Elizabeth strain *vivax* malaria were delayed from 8 to 12 months after exposure to infection. *Norman White*

SPICKNALL, C. G., TERRY, L. L. & COATNEY, G. R. **The Treatment of Falciparum Malaria with Intramuscular Chloroquine.** *Amer. J. Med. Sci.* 1949, Oct., v. 218, No. 4, 374–7, 1 fig. [12 refs.]

Eight patients who had acquired *P. falciparum* infections in Africa were given chloroquine intramuscularly—0·2 gm. of chloroquine base in 5 ml. of sterile unbuffered aqueous solution. Two to five days later each patient was

given a routine course of chloroquine by mouth. No adverse local reaction or toxic effect followed the injections. In six patients no asexual parasites were found in the blood after the injection. In the other two only very few ring forms were found when oral administration started. The drug appeared to have no effect on sexual parasites. The clinical response to the injection was striking. All patients were afebrile in one to two days; nausea and vomiting from which three patients suffered promptly subsided.

The parenteral administration of chloroquine is not recommended for patients who can take the drug by mouth; the drug is very rapidly absorbed from the alimentary tract.

Norman White

ARDIAS, A. La solfonoterapia della malaria. [**The Treatment of Malaria with Sulphone.**] *Arch. Ital. Sci. Med. Colon. e Parassit.* 1948, Aug., v. 29, Nos. 7/8, 115–33, 7 graphs & 1 coloured fig.

The author reports the results of experiments with sulphone-para-amino-phenyl-sulphone—in the treatment of malaria. Two hundred and forty-three patients suffering from malaria (155 *P. vivax*, 80 *P. falciparum* and 8 *P. malariae*) were treated with varying doses. The conclusions are: that sulphone in doses of 9 gm. has a marked action on certain stages of the development of the malaria parasite. Young trophozoites resulting from sporulation before they invade red cells are especially vulnerable. Injections of the drug immediately prior to the chill or rigor are very effective. The activity of sulphone in suppressing fever and parasitaemia is comparable to that of quinine and other antimalarials. Higher doses than 9 gm. are no more effective and present no advantage: smaller doses are ineffective.

Sulphone is no more effective than other antimalarial drugs in preventing relapses. A mixed sulphone and adrenaline treatment was successful in preventing relapse for about 3 months: further experiments are being made.

Norman White

FISCHER, O. Über die Wirkung kleiner Plasmochindosen auf die Gameten der Malaria tropica. [**The Action of Plasmoquine in Small Doses on Malaria Crescents.**] *Klin. Woch.* 1949, Apr. 1, v. 27, Nos. 13/14, 236.

The action of plasmoquine in ridding the blood of malaria gametocytes has been known for a long time; more important would it be if giving the drug might prevent their appearance in the peripheral blood and so remove from mosquitoes their source of supply.

The author has experimented with different doses of plasmoquine to find out how long time elapsed before crescents disappeared. Among 18 patients who had no plasmoquine (controls) crescents disappeared on an average on the 29th day (with limits of 11 and 41 days). Among 14 malignant tertian malaria patients to whom were given 5 doses of 0·03 gm. (total 0·15 gm.), they disappeared in 3–6 days (average 4·3 days) and in 5 no crescents appeared; among 31 given 5 doses of 0·015 gm. (total 0·075 gm.) they disappeared in 2–14 (average 5·5) days and again in 5 no crescents appeared; with dosage of $2 \times 0{\cdot}03$ gm. (0·06) given to 13 patients the gametocytes disappeared in 4–8 days and none at all was seen in two. Others are quoted, but generally it may be said that lessening of the dose meant lengthening of the interval before the blood was free. In practice the author recommends a total of 0·075 gm. in daily doses of $3 \times 0{\cdot}005$ gm. (=0·015 gm.). This dosage is, he says,

preferable on other grounds also [but not specified] to the 0·03 gm. daily, as was formerly given. Atebrin [mepacrine] could be prescribed at the same time without any untoward side-effects. *H. Harold Scott*

BOLDT, T. H. & GOODWINE, C. H. **A Second Year's Field Trial with Chloroquine Suppression of High Endemic Malaria in a Panamanian Village.** *J. National Malaria Soc.* 1949, Sept., v. 8, No. 3, 238–46.

The village of Piña, on the Atlantic Coast of Panama, is one of the villages in which ELMENDORF carried out experiments to determine the relative efficacy of various methods of malaria control [this *Bulletin*, 1947, v. 44, 882; 1948, v. 45, 1064]. In January 1947, the inhabitants of Piña were again offered suppressive chloroquine treatment. The drug was given once a week, the doses (of base) being 0·3 gm. for adults, 0·15 gm. for children 4–14 years old, 0·075 gm. for younger children. The controls were the malaria rates in Piña in 1945 when no treatment was given, and the malaria rates in the nearby comparable village of Rio Indio during 1947.

Of 282 persons examined during 1947, the cumulative positive parasite rate was 27·7 per cent. If "untreated cases" (those who had received no medication in 1946 and 1947 before the positive smear) and "treated positive cases" (persons who had been inadequately treated but had had some medication) be excluded the cumulative parasite rate in these 282 persons was reduced to 2·1 per cent. at the end of 1947.

The conclusion is reached that malaria infections can be suppressed, or possibly eradicated, in native populations if chloroquine be given regularly once a week in the above doses. The drug was well tolerated; no toxic symptoms were noted. *Norman White*

SEPULCRI, P. Malaria e DDT nelle bonifiche venete. [**DDT and Malaria Control in the Province of Veneto.**] *Riv. di Malariologia.* 1949, Aug., v. 28, No. 4, 221–40, 1 map. English summary.

The control of malaria by DDT spraying was started in the Province of Veneto in 1946 and this paper describes the extension of the campaign during the two following years and the results achieved. Primary malaria infections notified in 1945 numbered 5,624: the number fell during the next three years to 2,431, 487 and 85 respectively. The corresponding fall in the number of relapses recorded during the period was from 14,677 to 2,699. The spleen and parasite indices fell from 6·9 and 6·5 to 1·88 and 2·0 per cent.

From the point of view of fly control the results have not been satisfactory: flies have developed a marked DDT resistance. *Norman White*

JERACE, F. La lotta antimalarica nel Comune di Roma. [**The Antimalaria Campaign in the Commune of Rome.**] *Riv. di Malariologia.* 1949, June, v. 28, No. 3, 187–91, 1 chart. English summary (4 lines).

This short paper summarizes the remarkable results achieved during the last twenty years in the control of malaria in the Agro Romano by the Health Department of the Commune of Rome. The history of the pre-war achievement is well known. War conditions were responsible for a severe exacerbation of the endemic during the three years 1944–46 when 9,063, 11,025 and 2,453 cases of malaria were notified. Control measures were intensified and in 1947 DDT spraying of buildings was begun. Malaria incidence is now at a lower level in the Agro Romano than ever before. Only one case of locally

contracted primary malaria was recorded in 1948 ; during the first six months of 1949 not a single case was recorded, an unprecedented happening.

Norman White

MAURITIUS. **Report on Progress of Malaria Eradication Scheme, November 1949** [DOWLING, M. A. C.]. 23 pp., 19 figs. 1949, Port Louis : Govt. Printer. [25 cents.]

This report is based on less than a year's working of a " Malaria Eradication Scheme for the island of Mauritius ". One learns from the first paragraph that the work is being done by a research team appointed by the Colonial Office : it seems that their task is to direct " a campaign to eradicate from the island the disease malaria and if possible its vector the *Anopheles* mosquito ". It is clear that an adequate amount of fact is to be collected and studied so as to give a picture of the progress of the work.

It seems (but is not stated) that the general plan is to rely on spraying houses and all resting places against adult *Anopheles*. The island was divided into six areas (the central highlands not being sprayed, at least at the start). In two of these areas, spraying is with DDT in kerosene, in one with Gammexane in water suspension and in three with DDT in water suspension. The organization of the staff seems thorough. The first spraying of all areas was carried out early in 1949. The results are assessed partly on several hundred chemical examinations of deposits, and also on the numbers of mosquitoes caught before and after spraying in a large number of catching stations. In assessing the effect of the campaign, the spleen and parasite rates collected in 1942 and 1943 are compared with those found after the spraying had been completed. The reader cannot find what age-group was used in these studies though there is a reference to " children ". He may discover for himself from the tables that a large reduction has taken place both in the spleen and parasite rate ; it is not stated whether this might be a normal seasonal event.

On the entomological side it is clear that the campaign was mainly against adult *Anopheles* but we do not know how much larvicidal work, if any, was carried out. Though DDT in kerosene was used and applied to mud walls against *A. gambiae*, the report contains no discussion of the results of Muirhead THOMSON [see this *Bulletin*, 1949, v. 46, 439] who showed that in some parts of Africa DDT used in this way is a repellent, and that mosquitoes (*A. gambiae*) leave the treated houses without receiving a fatal dose. It seems that no examination has been made in Mauritius as to whether this is happening or not.

If one compares the results obtained in different parts of Mauritius one may assess the efficiency of Gammexane and DDT. The figures appear to indicate that the cost per room or per inhabitant is about equal and that there is no marked difference in the reduction of adult *Anopheles* : there is a satisfactory reduction of spleen and parasite rates in the areas treated with both insecticides.

P. A. Buxton

WHARTON, R. H. & REID, J. A. **D.D.T. and 'Gammexane' as Residual Insecticides against *Anopheles maculatus* in Malaya.** [Correspondence.] *Nature*. 1950, Jan. 7, 28–9.

The investigation was undertaken to determine whether Malayan mosquitoes (especially *Anopheles maculatus*, the principal malaria vector) react in the same way to residual insecticides as *Anopheles gambiae* has been reported to do [see Muirhead THOMSON, this *Bulletin*, 1947, v. 44, 795]. Experiments were done with small, human-baited, huts fitted with window traps to catch mosquitoes escaping at dawn. The interior of one hut was treated with a DDT 33 per

cent. wettable powder at the rate of 200 mgm. DDT per square foot. Another was treated with a Gammexane wettable powder at the rate of 40 mgm. *gamma* BHC per square foot. A third was untreated and acted as a control. The results over a period of 12 weeks were as follows :—

Hut	No. *A. maculatus* recovered	In hut per cent.	In light trap per cent.	Blood-fed per cent.	Dead (in morning) per cent.	Dead (24 hours later) per cent.
DDT ...	341	34	66	80	64	86
γ BHC ...	269	21	79	51	88	99
Control ...	426	4	96	90	2	22

These results show a considerable difference between *A. maculatus* and *A. gambiae*. Since *A. maculatus* normally leaves before dawn in untreated houses, the irritant repelling effect of DDT is unimportant, especially since *maculatus* mosquitoes mostly pick up a lethal dose of DDT during their visit to a treated hut.

Effects on large numbers of culicines which entered the huts were as follows :—

Weeks after treatment	Control hut		DDT hut		*Gamma* BHC hut	
	No. entered	Per cent. dead	No. entered	Per cent. dead	No. entered	Per cent. dead
1–4	547	0·5	491	13	626	84
5–8	1,519	2·2	1,352	5·8	1,397	40
9–12	867	3·6	1,026	7·8	617	22

These culicines (mainly *Culex fatigans*) react more like *Anopheles gambiae*. Both species normally rest indoors during the day but both are driven out by DDT, which, however, is not highly lethal. The *gamma* BHC also drove a large proportion of *Culex fatigans* into the light trap, but not before many of them had received a lethal dose. *J. R. Busvine*

JONES, T. W. T. **Experimental Aerial Spraying with DDT against Mosquitos in Burma.** *Bull. Entom. Res.* 1949, Dec., v. 40, Pt. 3, 379–85, 1 text fig. & 6 figs. on 1 pl.

An attempt was made to determine whether DDT solution applied from the air has any action on larvae breeding in open ponds containing varying degrees of vegetative growth. Also whether the filtration of the spray by closely growing tall trees protects the shrubs at ground level from contamination and so provides safe shelter for resting adult mosquitoes. The sites of this investigation were Royal Lake and a village on Akyab Island, Burma. Along the northern bank the lake is covered with different types of vegetation, sparse in some places and dense in others. Ten test points in a 500-yard stretch were selected. Anopheline larvae were plentiful ; three species were identified, *A. jamesi*, *A. annularis* and *A. hyrcanus*. Test papers indicated that spraying of a 5 per cent. DDT solution laid down a concentration of DDT ranging from two to three milligrammes per square metre. (The method of estimation is described.) Larval counts up to the tenth day after the single spraying from the air showed a clearance of larvae from the test points, except where there was a thick growth of the water plant *Limnanthemum*, or where tall grass was prevalent. At this

concentration aerial spraying failed to reach the water surface in the presence of a thick vegetation. Residual effect of DDT did not exceed six days at these cleared points.

The effect on adult mosquitoes was investigated in the vicinity of a village situated in clearings of dense woodland ; a new compact section of the village was on open ground. Test papers indicated that the spray failed to penetrate into heavily wooded areas so as to contaminate small shrubs in dense shade, where mosquitoes rest during the day. In the " open " section of the village house catches fell to nil but in the " wooded " section numbers were only reduced. Test papers showed no evidence of penetration of the dwellings by the aerial spray.

[The method of dispersion from the aircraft is not mentioned. KRUSE and METCALF quote an optimum size of aerosol droplet as essential for penetration of vegetation ; this particle size is less than 50 microns. They also quote deposit figures of DDT per acre according to degree of cover (this *Bulletin*, 1946, v. 43, 1111).] *R. Ford Tredre*

SUNDARARAMAN, S. & PEFFLY, R. L. **Effectiveness against Flies and Mosquitoes of DDT Applications to Clay, Palm and Straw Surfaces.** *J. National Malaria Soc.* 1949, Dec., v. 8, No. 4, 267–9.

" Laboratory tests were carried out to determine the relative effectiveness against house flies and mosquitoes of different DDT formulations when applied as residual treatments to three types of wall surfaces commonly used in the construction of houses in rural India—straw and palm-leaf thatches, and clay with a surface wash of cow dung. Adults of *Musca domestica* L. and *Anopheles quadrimaculatus* Say were employed as test insects. On each type of surface suspensions of DDT were more effective than solutions or emulsions, although on straw surfaces the last two were effective for nearly as long as the suspensions. On clay panels the best of the treatments, a commercial wettable powder, was effective for only four weeks."

DARROW, Edith M. **Factors in the Elimination of the Immature Stages of *Anopheles quadrimaculatus* Say in a Water Level Fluctuation Cycle.** *Amer. J. Hyg.* 1949, Sept., v. 50, No. 2, 207–35, 7 figs. [22 refs.]

Several thousand larvae of *Anopheles quadrimaculatus* were put into an experimental pool in the Tennessee Valley Authority's impoundments ; data are presented showing the effect on the larvae of lowering the water level. The field observations were supplemented by experiments in the laboratory.

When the water level was lowered the proportion of larvae left stranded increased with the abundance of the marginal vegetation and floatage, and the rapidity of the " drawdown ". With a moderate cover, 75 per cent. or more of the larvae were flushed out into the open water where they were destroyed by fish and other predators. Survival among stranded larvae was affected by temperature and humidity and by the water content of the soil, and by the presence of insect predators. Even in favourable conditions no stranded larva lived longer than 48 hours ; larvae and pupae survived overnight strandage, but evaporation killed 90 per cent. of the larvae and 75 per cent. of the pupae during an eight-hour exposure in the daytime ; those on trampled soil were able to survive a higher evaporation rate than were those on firmer soil. Though pupae were better able to survive desiccation than larvae and some even gave rise to adults while lying on the mud, about a fourth of those returned to water after 24 to 36 hours strandage were unable to produce adults.

Higher moisture content of the soil permitted longer survival, and larvae seemed able to absorb moisture from the soil to replace that lost to the atmosphere. The availability of the moisture varied with the type of soil and with its moisture content.

Pupae on soil in saturated air survived as long as did control pupae in water, but the number which successfully produced adults was but 55 to 72 per cent. of those which successfully emerged from the control pupae. Eggs had to complete two- to three-tenths of their development before they were able to resist desiccation ; on damp mud or in saturated air some continued to develop for as long as six days, but would not hatch until they were in free water.

Insect predators chiefly of the family Dolichopodidae killed stranded larvae and pupae by day but not by night. Ants seemed to be even more destructive than the flying insects and it is thought they may be of value in destroying anopheline eggs, though no observations were made on this point.

H. S. Leeson

GOODWIN, L. G. **Response of** *Plasmodium berghei* **to Anti-Malarial Drugs** [Correspondence.] *Nature.* 1949, Dec. 31, 1133.

In 1948, VINCKE and LIPS discovered *Plasmodium berghei* [this *Bulletin*, 1948, v. 45, 979] and in 1949, FALCO *et al.* [this *Bulletin*, 1949, v. 46, 1125] described experiments on a series of 2 : 4 diaminopyrimidines. The author used a strain of *P. berghei* in mice for investigating one of these drugs, " 48-210 " (2 : 4 diamino-5-*p*-chloro-phenoxy-6-methyl pyrimidine) simultaneously with a similar assay of it against *P. gallinaceum* in chicks at the same dose-level.

The tests were done after the method of CURD, DAVEY and ROSE [this *Bulletin*, 1946, v. 43, 394].

Each mouse was given about five million parasitized red cells intraperitoneally in heparinized saline. For the next three days six doses of the drug were given by stomach tube night and morning. On the fifth and seventh days the percentage of parasitized cells for each mouse was determined in blood smears.

The results, which were compared with standard antimalarials, are shown in a table :—

Drug	Quinine equivalent	
	P. gallinaceum	*P. berghei*
" 48-210 "	4·3	4·7
" Mepacrine "	2·0	7·8
" Pamaquin "	18	2
" Chloroquin "	13	13
" Paludrine "	12	4·6

The quinine equivalents of " 48-210 " and chloroquine are about the same upon the two species of *Plasmodium* ; the other three drugs show very different figures. For example, the relative activities of pamaquin and mepacrine are reversed and the activity of pamaquin against *P. berghei* is very low (and has since been confirmed).

It is suggested that these variations may be due to differences in the rate of absorption and excretion of the drug in mice and chicks or in the relative susceptibility of the respective parasites. *H. J. O'D. Burke-Gaffney*

SCHNEIDER, J., DECOURT, P. & MONTÉZIN, G. Sur l'utilisation d'un nouveau Plasmodium (*Pl. berghei*) pour l'étude et la recherche de médicaments anti-paludiques. (Note préliminaire). [**The Use of a New** *Plasmodium* (*P. berghei*) **in testing Antimalarial Drugs.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 449–52.

The activity of four drugs, quinine, plasmoquine, atebrin [mepacrine] and resochin [Nivaquine], was tested against *Plasmodium berghei* in mice. The minimum active dose was defined as that dose which, repeated daily for three days from the day of inoculation, retarded the appearance of parasites in the blood for at least three days, in 75 per cent. of the treated cases, as compared with controls. The drugs were given in solution and inoculated subcutaneously. The respective active doses per kilogramme of mouse were as follows: quinine 80 mgm., plasmoquin 3·25 mgm., atebrin 2–4 mgm., and resochin 1–2 mgm. The lethal dose was much closer to the therapeutic in the first two as compared with the last two drugs. These figures are different from those which the authors obtained with other malarial parasites (*P. relictum* and *P. gallinaceum*) and thus confirm the necessity of employing different species of parasite to test chemotherapeutic activity.

P. C. C. Garnham

BECKER, E. R., BRODINE, C. E. & MAROUSEK, Alice A. **Eyelid Lesion of Chicks in Acute Dietary Deficiency resulting from Blood-Induced** *Plasmodium lophurae* **Infection. I. Description ; Role of Pantothenic Acid and Biotin.** *J. Infect. Dis.* 1949, Nov.–Dec., v. 85, No. 3, 230–38, 11 figs. on 2 pls. [14 refs.]

While investigating the effect of diet on *P. lophurae* infections in chickens a lesion of the eyelids was encountered when the birds were fed on a certain ration (G) containing 82 per cent. of cereal grain products. The lesion did not appear however, when the chicks were fed on an essentially similar diet (S) the biotin and pantothenate content of which were nearly the same. TRAGER [this *Bulletin*, 1943, v. 40, 675] had previously found that pantothenate favoured the survival of this parasite *in vitro* but that *in vivo* infections of chicks and ducklings were uninfluenced by a pantothenate-deficient diet. BRACKETT *et al.* [*ibid.*, 1947, v. 44, 291] found, on the other hand, that when pantothenate was used to supplement the diet of chicks infected with *P. gallinaceum* a more intense parasitaemia resulted than was present in pantothenate-deficient birds. The former author also found [*ibid.*, 1943, v. 40, 825] that biotin deficiency lowered host resistance and more deaths occurred from higher parasitaemia. The test rations were given in food to chickens from seven days old and were supplemented with biotin and pantothenate as required. When the chickens were 12 to 14 days old they were inoculated intravenously with 1 or 2×10^8 parasitized cells from donor birds.

The conditions of feeding under which the eyelid lesions occurred are given in detail. These lesions were heralded by hypersensitivity to light followed by watery discharge and appearance of discoloured patches on the margin of the lower lid, accompanied by exudation and injection of the lining conjunctiva up to the fifth or sixth day of infection. This was followed by scabbing of both lids and dry gangrene then appeared and the lids sometimes could not be separated. From the 9th to 12th day the scab was shed and regeneration by smooth tissue took place. After three weeks, in severe cases, the eyeball was completely covered by fusion of the edges of the new tissue, and in less severe cases a slit remained or a notch persisted in the lower lid. The acute onset and severity of the lesion, illustrated in photographs, was

striking and appeared to be definitely associated with a certain degree of parasitaemia attained within a definite period. It was established that the character of the ration was equally important. The appearance of the lesions could be prevented by supplementing the diet with biotin or pantothenate. It was not determined why chicks fed on a similar ration failed to develop the lesions. The rôle played by the malarial infection was also not clearly demonstrated. The authors believe the evidence points to an acute dietary deficiency as a result of competition of host and parasite for either biotin or pantothenate or both, but consider that other factors are also involved.

J. D. Fulton

REILLY, J., CHEN, G. & GEILING, E. M. K. **An Evaluation of Antimalarials with *Plasmodium lophurae* in the Chick.** *J. Infect. Dis.* 1949, Nov.–Dec., v. 85, No. 3, 205–12, 4 figs.

Chickens infected with *P. lophurae* have been used as experimental hosts for the evaluation of potential antimalarials by the drug-diet method. Young white Leghorn cockerels weighing 50 to 60 gm. when eight to nine days old were maintained on a three-hour light and dark schedule at a temperature of 90°F. in well-ventilated cages after inoculation intravenously with 0·2 cc. blood containing 50 million parasites, in groups of 90 to 120. By this technique it was found that a 20 to 30 per cent. parasitaemia occurred on the fourth day, before acquired immunity had developed. The drug-diet was given 12 hours after inoculation for a period of five days in such quantities that parasitaemia was reduced by 10 to 90 per cent. compared with controls, and the mean parasite count was determined on the fourth day. The drugs used were quinine, which served as a standard, quinacrine (mepacrine), pamaquine (plasmoquine) and pentaquine. The concentration of drug in the diet which suppressed parasitaemia by 50 per cent. was used to compare the relative antimalarial potencies. Acquired immunity was manifested on the fifth day of infection and its intensity was proportional to the number of parasites which had been destroyed. For that reason antimalarial potencies were estimated on the fourth day since the drug effects produced were uncomplicated by immunity. The quinine equivalents of quinacrine, pamaquine, and pentaquine were found to be $1{\cdot}5 \pm 0{\cdot}16$, $29{\cdot}4 \pm 2{\cdot}8$ and $158{\cdot}5 \pm 26{\cdot}7$ respectively. *J. D. Fulton*

VEROLINI, F. Sulle modalita' di comparsa del ciclo endoistiocitario del *P. gallinaceum* in polli previamente splenectomizzati. [**Appearance of the Endohistiocytic Cycle of *Plasmodium gallinaceum* in Splenectomized Fowls.**] *Riv. di Parasit.* Rome. 1949, Dec., v. 10, No. 4, 197–204.

The English summary appended to the paper is as follows :—

" The course of a *P. gallinaceum* infection in previously splenectomized fowls is studied with particular regard to the behaviour of the endohistiocytic cycle.

" The author describes the technique of splenectomy and that of the cerebral biopsies used for following the course of the endohistiocytic cycle in the brain capillaries.

" Two groups of experiments are reported : in the first group splenectomized fowls were infected with blood taken during the first few days of a primary attack of a *P. gallinaceum* infection ; in the second, splenectomized fowls were infected with emulsion of endohistiocytic forms.

" In the two groups the splenectomy did not modify the course of the infection and the moment of appearance of the endohistiocytic cycle in splenectomized animals was exactly the same as in normal animals."

DUBIN, I. N., LAIRD, R. L. & DRINNON, V. P. **The Development of Sporozoites of *Plasmodium gallinaceum* into Cryptozoites in Tissue Culture.** *J. National Malaria Soc.* 1949, Sept., v. 8, No. 3, 175–80, 1 fig. [10 refs.]

This paper appears to be the first to describe the development of sporozoites into cryptozoites *in vitro*; all previous attempts have been unsuccessful. The authors employed sporozoites of *P. gallinaceum* contained in salivary glands of *Aëdes aegypti* mosquitoes. Sterility was ensured by the use of antibiotics, all solutions containing 100 units of penicillin and 400 microgrammes of dihydrostreptomycin per cc. The glands were suspended in a balanced salt solution consisting of glucosol adjusted with sodium carbonate to *p*H of 7·2 to 7·4. The cultures of tissue were set up four days before inoculation in bottomless Carrel flasks in which coverslips had been cemented. Spleens of chick embryos 17 to 19 days old were used, and a nutrient of 20 per cent. chicken serum in Tyrode's solution, the *p*H being controlled by a continuous flow of 2 per cent. CO_2. The cultures were incubated at 37°C. for 48 to 72 hours.

This method gave many successful results (12 out of 18) though the distribution of cryptozoites in the culture was irregular, the parasites tending to occur in clumps. Growth took place in the macrophages, as many as 12 parasites being found in a single cell. Their morphology was identical with that of the exo-erythrocytic forms seen in cultures of infected spleens. The cryptozoites grew to maturity in 48 hours; the next generation was less profuse and metacryptozoites in 72 hours were much scantier.

[This represents an important advance in malaria research. Unfortunately the complete details of the method are not recorded, though a paper on the subject by the senior author is stated to be in preparation.] *P. C. C. Garnham*

BECKMAN, H. **Influence of Cells and Plasma on *in vitro* Survival of Malaria Sporozoites.** *Proc. Soc. Exper. Biol. & Med.* 1949, Oct., v. 72, No. 1, 204–6.

Mosquitoes infected with *Plasmodium cathemerium* were ground in Locke's solution and the suspension was mixed with various combinations of canary and hen bloods. The final mixtures were incubated at 41·5°C. for 1½ hours and inoculated into canaries to test the viability of the sporozoites. Clear-cut results were obtained and may be summarized as follows:—

1/10th canary blood, 9/10th hen blood	...	27 per cent. developed infection.
5/10th ,, ,, 5/10 ,, ,,	...	72 ,, ,, ,, ,,
9/10th ,, ,, 1/10 ,, ,,	...	87 ,, ,, ,, ,,
Canary plasma	...	0 ,, ,, ,, ,,
Hen ,, ...	...	0 ,, ,, ,, ,,
Canary plasma plus canary cells ...	...	100 ,, ,, ,, ,,
,, ,, ,, ,, and hen cells	...	74 ,, ,, ,, ,,
,, ,, ,, hen cells	...	0 ,, ,, ,, ,,
Hen ,, ,, ,, ,, ...	...	0 ,, ,, ,, ,,
,, ,, ,, ,, and canary cells	...	85 ,, ,, ,, ,,
,, ,, ,, canary cells ...	...	100 ,, ,, ,, ,,
Canary ,, ,, ,, erythrocytes	...	41 ,, ,, ,, ,,
,, ,, ,, ,, leucocytes	...	93 ,, ,, ,, ,,

Thus sporozoites failed to survive in the plasma derived from either canary or hen, or in whole hen blood. The vital component appeared to be canary cells and more particularly the white cells. It was difficult to ensure the complete separation of red and white cells, and this possibly accounts for the slightly inconclusive results.

[These interesting observations would have been more valuable if more details of the experiments had been given. What was the species of mosquito used and what component of the mosquito was ground (*e.g.*, whole insect or

only salivary glands?). Also these results appear to conflict with previous work on the successful survival of sporozoites in plasma. The reviewer, for instance has kept sporozoites of *P. gallinaceum* in hen plasma for as long as 72 hours and successfully infected chicks with the suspension [see also this *Bulletin*, 1948, v. 45, 1067]. *P. C. C. Garnham*

MICKS, D. W. **Investigations on the Mosquito Transmission of** *Plasmodium elongatum* **Huff, 1930.** *J. National Malaria Soc.* 1949, Sept., v. 8, No. 3, 206–18, 3 figs. [14 refs.]

The susceptibility of various species of mosquitoes to infection with *Plasmodium elongatum* occurring in canaries, sparrows and ducks was tested. Partial oöcyst development was found in many of the experiments, the oöcyst growing to a size of about 28 μ in a fortnight ; the wall then thickened and further development ceased. This incomplete development was found in *Culex restuans*, *Aëdes triseriatus* and *Culex pipiens* ; no infection whatsoever occurred in *C. quinquefasciatus* [*C. fatigans*], *Aëdes aegypti*, *A. atropalpus*, *A. vexans* and *Anopheles quadrimaculatus*. Complete development with the sporozoites reaching the salivary glands took place in *Culex pipiens* fed on infected ducks. Five per cent. of these became infective in 10–12 days, and clean ducks were infected by the bites of these mosquitoes, though the resultant disease was mild and showed a low percentage of gametocytes. A successful attempt, by the method employed by HUFF [this *Bulletin*, 1930, v. 27, 892] for *P. cathemerium*, was made to increase the susceptibility of *C. pipiens* to *P. elongatum*. The progeny from infected females was selected, and successive generations were bred from the susceptible individuals of each. The percentage found infected, rose steadily from 13 per cent. in the first generation to nearly 50 per cent. in the sixth. The oöcysts were much more numerous and more regular in size in this selected strain of mosquitoes.

In an interesting discussion, the authors refer to other experiments on the mosquito transmission of *P. elongatum*. It appears that different strains of this parasite exist, some of which, like the Italian one, are highly infectious to certain mosquitoes (*e.g.*, *C. quinquefasciatus*) while others are quite incapable of infecting such mosquitoes. In all cases *Aëdes aegypti* failed to become infected. *P. C. C. Garnham*

MANWELL, R. D. *Plasmodium oti* **and** *P. hexamerium*. *J. Parasitology*. 1949, Dec., v. 35, No. 6, Sect. 1, 561–5, 16 figs. on pl. [14 refs.]

" *Plasmodium hexamerium* and *P. oti* have been carefully studied in the laboratory, and found essentially similar in morphology, type of infection produced in the canary, and in other respects. It is therefore concluded that *Plasmodium oti* should be regarded as a synonym of *Plasmodium hexamerium*.

" A number of new host species are also reported for the latter species."

ERRATUM

In the abstract of the paper by GAHAN, DOWNS & CELIS, this *Bulletin*, 1949, v. 46, 1119, the word " not " on the seventh line from the end should be omitted. The sentence beginning on the previous line should therefore open " It is evident that the DDT applications did kill enough adult mosquitoes to reduce the breeding in the surrounding rice-fields "

BLACKWATER FEVER

FINDLAY, G. M. **Blackwater Fever in West Africa, 1941–45. I. Blackwater Fever in European Military Personnel.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 140–54, 4 figs. [23 refs.]

In the second world war, when considerable forces were stationed in West Africa, blackwater fever was a major health problem among them. It caused the deaths of 59 European officers and men, 34·91 per cent. of the total deaths from medical causes, among the 50,000 British troops stationed in West Africa between 1940 and 1945. Most of these Europeans had no immunity to the local strains of malaria parasites. The annual incidence of blackwater fever and the corresponding rates per 10,000 strength for each of five years were: 1941, 36 (56·1); 1942, 102 (82·9); 1943, 39 (30·6); 1944, 2 (2·3); 1945, nil. The peak incidence was from July to October 1942. Of the 179 cases, 132 were among persons in their first tour of duty in West Africa, and who had not previously lived in an endemic malaria area. Most of these occurred after from eight to 18 months' residence. The earliest case occurred after four weeks' residence only. In all cases in which malaria parasites were found in the blood in association with blackwater fever the species involved was *P. falciparum*. Among 152 patients with a more or less reliable medical history there were only 14 who stated that they had never had a clinical attack of malaria before the onset of fever that was associated with haemoglobinuria.

During the period in question there was increased efficiency in malaria control. The number of malaria cases and the incidence of blackwater fever per 1,000 cases were: 1941, 5,320 (6·76); 1942, 8,834 (11·54); 1943, 4,489 (8·68); 1944, 2,319 (0·85); 1945, 568 (0). In March 1943, mepacrine was substituted for quinine as a suppressive. Thereafter there were only 19 cases of blackwater fever in Europeans. Fourteen of these had either still been taking quinine as a suppressive or had been given quinine on admission to hospital for malaria before developing blackwater fever.

The conclusion is that mepacrine protected the European personnel against blackwater fever during 1944 and 1945. *Norman White*

FINDLAY, G. M. **Blackwater Fever in West Africa, 1941–45. II. Blackwater Fever in African Military Personnel.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 213–24, 2 figs. [23 refs.]

Blackwater fever cases among African soldiers in West Africa increased in number year by year from 1941 to 1945. The incidence and the rates per 10,000 strength were: 1941, 1 (0·23); 1942, 6 (0·68); 1943, 13 (1·30); 1944, 36 (5·49); 1945, 66 (12·77). The incidence of blackwater fever per 1,000 cases of malaria in each of these five years was: 0·86, 1·64, 3·56, 11·10, and 32·40. African troops did not take any malaria-suppressive drug, neither quinine nor mepacrine. Other antimalarial control measures presumably reduced the number of infected mosquito bites for African as well as for European troops, but they certainly did not decrease the incidence of blackwater fever among the former—rather the reverse. In diagnosing blackwater fever among Africans other causes of haemoglobinuria were carefully excluded. The increase of blackwater fever among African troops would appear to have been due to a loss of immunity to malaria, or to a loss of premunition, consequent upon the decreased frequency of, but not freedom from, bites of malaria-infected mosquitoes, as a result of control measures. Quinine was obtainable only with great difficulty and evidence that it had played a possible rôle in the causation of blackwater fever in these African troops appeared in only one case.

Norman White

KHO LIEN KENG. Een onderzoek op malaria en zwartwaterkoorts in een wijk van Batavia. [**Malaria and Blackwater Fever in a District of Batavia.**] *Nederl. Tijdschr. v. Geneesk.* 1949, May 21, v. 93 (ii), No. 21, 1673–81, 3 figs. English summary (5 lines).

The English summary appended to the paper is to the following effect :—

During the war period (1942–1945) a malaria epidemic occurred in a town district of Batavia where malaria had been normally only mildly endemic. Seventeen persons, of whom 15 were immigrants, developed blackwater fever, with multiple attacks in four, during the epidemic. Both before and afterwards there had been no blackwater fever. It is concluded that the high frequency of malaria attacks was of paramount importance in relation to this blackwater fever outbreak.

BABEAU & FOURRIER. Un cas de fièvre bilieuse hémoglobinurique guéri par la méthionine. [**A Case of Blackwater Fever cured by Methionine.**] *Algérie Méd.* 1949, Apr., No. 4, 165–6.

A man of 24 in Algeria, who suffered from malaria every year (and once from schistosomiasis) was treated at home during one attack with 0·5 gm. of quinine intramuscularly. After four injections he was well enough to renew work : but some two weeks later, another attack occurred and again he was given 0·5 gm. of quinine intramuscularly. That night blackwater fever developed. The attack was severe, with raised blood urea and a great diminution of red blood cells.

He was treated with high doses of quinacrine [mepacrine], 0·15 gm. twice daily for nine days, together with the usual supportive treatments. The case is described in detail, but the striking factor is that, although the temperature fell, the haemoglobinuria persisted ; and eventually when the patient was dangerously ill despite treatment, he was given methionine in the form of six tablets daily (each of 0·5 gm.) of lobamine-iron. In 48 hours, the haemoglobinuria ceased, the patient improved and the red cell count increased. Mepacrine was stopped but methionine was continued.

A week later, the patient had an attack resembling acute cholecystitis, but no haemoglobinuria. This was treated on orthodox lines and disappeared in five days. The patient made a good convalescence.

The authors state that blackwater fever is rare in Algeria. They ask whether the previous attack of schistosomiasis could be related to the development of blackwater fever : undoubtedly, in this case the quinine was so related.

The dramatic effect of methionine is commented upon and its action discussed. The authors also refer to the high doses of mepacrine given ; this reduced the temperature but was apparently without effect on the haemoglobinuria. *H. J. O'D. Burke-Gaffney*

TRYPANOSOMIASIS

NIGERIA. **Annual Report Sleeping Sickness Service 1948** [MCLETCHIE, J. L.]. 7 mimeographed pp.

During 1948 more than a million people were examined and 11,230 cases were treated (3,860 in the field, 7,334 at dispensaries and 36 in mining camps) by the Nigerian Sleeping Sickness Service. In Government and Mission Hospitals not administered by the Service the number treated was 2,345.

Districts surveyed for the first time were in Kano, Plateau, Benue, Ogoja and Cameroon Provinces, and the index of new infections among 319,437 people was 0·17 per cent. (*i.e.*, 546 cases), ranging from 0·02 per cent. in the Wase district of Shendam, Plateau Province, to 1·7 per cent. in the Ogoja Division, Eastern Region.

At re-surveys in the known endemic areas the index of new infections among 511,136 people was 0·65 per cent. (3,314 cases), the lowest being 0·1 to 0·4 per cent. in Kano, Zaria, Niger, Benue and Rivers (Owerri) Provinces and the highest about 1 per cent. in Katsina, Plateau, Bauchi and Ogoja. In 1947 the index was 0·5 per cent. and in 1946 it was 0·98 per cent.

An example of the characteristic endemic distribution is provided by analysis of dispensary reports of re-surveys in the Galadima District of Katsina, which shows that an index of new cases of 1·0 per cent. was largely due to five riverine groups of small villages and hamlets, in which a population of 14,408 provided an index of 4·4 per cent., the remaining 68,077 in the district providing 0·3 per cent.

The staffs of fixed dispensaries were increasingly encouraged to go on tour and diagnose cases in their own homes, so that infections should be treated at an earlier stage. It seems that about one-fifth of all cases treated at dispensaries are relapses; thus in the Northern Provinces the attendants differentiate between new infections and relapses, and their returns showed 5,590 new cases and 1,367 relapses. It is roughly estimated that among approximately 9,000 new infections treated at dispensaries in 1947 the relapse rate observed in 1948 was about 15 per cent.

With regard to mass prophylaxis, this is apparently confined to the mining camps. In the two principal mining areas, the Wamba and Jemaa Divisions of Plateau Province, the labourers, about 3,500 in number, are now given pentamidine prophylaxis on engagement and at regular intervals of four to five months thereafter. The 14 new infections in these areas were all in men who happened not to have received pentamidine. In a careful examination of the entire labour force, including lumbar punctures of 105 men with suggestive symptoms, only two were found to be possible cases of cryptic infection by reason of having abnormal cerebrospinal fluids. The history of prophylaxis and incidence in these mining areas is interesting. The labour force has been maintained at 3,500 to 4,000 since 1945. In that year pentamidine was used in a few camps only, and there were 170 new infections. Thereafter the drug was increasingly used, and in 1946 the number of new infections fell to 161, and in 1947 to 85. In 1948 there were only the 14 new cases and two possible cryptic infections mentioned above.

Tsetse control staff were active in Kano, Katsina, Zaria, Plateau and Benue Provinces, where many new areas were surveyed, new clearings made, and old clearings maintained and inspected. This work included the posting of a control officer for the first time to the Tiv Division of the Benue Province, where about 400 square miles of the central part of the Division were surveyed for fly and 40 square miles mapped in detail. In the Anchau Corridor, barriers were found to be fully effective; and 18 miles of partial clearance and five miles of barrier clearance were made south of Anchau to connect with similar work planned in Tudan Wada, Kano. Extensive clearing, and survey preliminary to still further clearing, is also spreading out from the Corridor in the Kubau part of Anchau, and in other areas.

The success of the Anchau Tsetse-free Corridor scheme [this *Bulletin*, 1946, v. 43, 1022; *ibid.*, 1949, v. 46, 229] is reflected in the remarkably rapid social and economic progress in the area, for example "in the ease with which increased taxes are paid without the need to sell staple crops and with which capital is produced to purchase cattle; in the hundreds of cycles where there

were only a few ten years ago ; in the trebling of the number of sewing machines ; in the purchase of cigarettes and other former luxuries. This economic development is on a sound basis with improving health and diet for the farmer, a diversity of crops and an increase in livestock. There are now 80 mixed farmers where there was one in 1937. Many others have livestock if, as yet, no plough. Sugar crushers have increased from one to 42, and the production of cane has gone up correspondingly. The amount of cotton grown is also increasing." Pig breeding and the planting of fruit trees, introduced as integral parts of the scheme, have been actively continued.

In addition to the control of sleeping sickness, the S.S. Service has provided Field Units to deal with serious epidemics of meningitis and relapsing fever in Kano, Katsina, Sokoto, Plateau, and Bauchi Provinces. Many cases of yaws and schistosomiasis have also been treated.

[There does not seem to have been any particular expansion of senior staff ; indeed mention is made of several transfers of experienced officers to the newly formed West African Institute for Trypanosomiasis Research. Yet the report modestly conceals the fact that far more people appear to have been examined for sleeping sickness than ever before. In the report for 1946 (this *Bulletin*, 1947, v. 44, 973) it was mentioned that a record number of " more than half a million " people were examined. This year (1948) it is " more than a million ". In other branches of sleeping sickness control also—and incidentally in the large-scale treatment of other epidemic and endemic diseases—so much has been done that one cannot fail to be greatly impressed.]

E. M. Lourie

See also p. 305, BRISCOE, **Insect Reconnaissance in Liberia, West Africa.**

MOGGRIDGE, J. Y. **Climate and the Activity of the Kenya Coastal** *Glossina*. *Bull. Entom. Res.* 1949, Aug., v. 40, Pt. 2, 307–21, 6 figs.

" This paper deals with *Glossina pallidipes*, *G. austeni*, and *G. brevipalpis* as they occur on the Kenya coast.

" Temperature and saturation deficiency both exert a generally inverse effect on the activity and apparent density of both *G. pallidipes* and *G. austeni*. True density also varies inversely as the s.d.

" ' Rush activity ' is a term used to express the exceptional activity displayed by both *G. pallidipes* and *G. austeni* in the morning during periods of severe dry weather. This extreme form of activity is displayed by both sexes. The theory that rush activity is really compressed activity induced by very high temperatures and s.d. later in the day is supported in a discussion of the reaction of *G. pallidipes* in two adjacent vegetation types under normal and abnormal dry season conditions.

" Teneral tsetses were taken in remarkably small numbers on all rounds. Data were kept for *G. pallidipes* only. Females formed a large proportion of the catches of teneral tsetses. Teneral tsetses showed no apparent preference for marginal areas ; they are more numerous in the wet season.

" The activity and density of female *G. pallidipes* appeared to be influenced by the same factors and in the same way as the males. Adequate data on *G. austeni* were obtained from the forest only, but there are indications of seasonal fluctuations in female percentage. Females of both species are distributed evenly throughout the vegetation types and no marked vegetational preferences are shown. The females of *G. brevipalpis* formed only a very small proportion of the total catches.

" The numbers of marked tsetses of all three species recaptured were very small indeed. The majority were recaptured after the lapse of a few days in

the same locality as that in which the original markings had been made. *G. pallidipes* was recaptured in greater numbers during the humid season."

MOGGRIDGE, J. Y. *Glossina pallidipes* **and Open Country in the Coastal Area of Kenya.** *Bull. Entom. Res.* 1949, May, v. 40, Pt. 1, 43–7, 1 fig.

" *Glossina pallidipes* does not readily attack objects moving along the edge of vegetation forming its habitat ; fewer tsetse attack under humid than under dry conditions, but those that do seem to range further.

" Parties of men moving out of heavily infested thicket did not carry tsetse far into the open. Few tsetses attached themselves to the men and these became gorged within a few yards of the thicket edge. Similar results were obtained when bait cattle were used.

" Experimental catches in a glade showed, even during the humid season, an extraordinary reluctance on the part of *G. pallidipes* to approach a party moving through the glade at so short a distance as 8 yards from the thicket, but further experiments showed that a party staying in the glade for a short time made a much larger catch."

ROLLO, I. M., WILLIAMSON, J. & LOURIE, E. M. **Studies on the Chemotherapy of Melaminyl Arsenicals and Antimonials in Laboratory Trypanosome Infections.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 194–208, 1 fig. [26 refs.].

" Melarsen " is a melaminyl-substituted phenylarsonate. " Melarsen oxide " is the corresponding trivalent product. " MSb " and " MSb3 " are the antimonial analogues of melarsen and melarsen oxide, respectively.

All these compounds were originated by FRIEDHEIM, who also reported the first field trials of melarsen [this *Bulletin*, 1941, v. 38, 634]. Field trials of melarsen oxide have also been published [*e.g.*, WEINMAN and FRANZ, *ibid.*, 1946, v. 43, 207 ; VAN HOOF, *ibid.*, 1947, v. 44, 1048 ; FRIEDHEIM, *ibid.*, 1949, v. 46, 711]. Cursory mention of field trials with MSb and MSb3 in French West Africa has been made by LE ROUZIC and LAPEYSSONNIE [*ibid.*, 919].

The present communication is a report on experimental work with these compounds in *T. rhodesiense* infections in laboratory animals, but it is emphasized that the strain of trypanosome is an old one, and that it is now an indicator of possible effects in field infections of *T. gambiense* and not of *T. rhodesiense*. The work included comparative tests between the new compounds and tryparsamide, mapharside, butarsen [see EAGLE *et al.*, this *Bulletin*, 1945, v. 42, 15 ; *ibid.*, 1946, v. 43, 1017], pentamidine and stibenyl.

In mouse infections, melarsen among the pentavalent compounds exhibited a significantly higher, and MSb a much higher chemotherapeutic index than tryparsamide ; melarsen oxide and MSb3 among the trivalent compounds exhibited much higher indices than mapharside or butarsen. In rabbit infections only the pentavalent compounds were tested ; both melarsen and MSb appeared to be more effective than tryparsamide.

In keeping with the therapeutic superiority of melarsen over tryparsamide and of melarsen oxide over mapharside, the trypanocidal power of rabbit serum tested *in vitro* was greater and could be demonstrated for a longer time after a subcutaneous injection of melarsen than after tryparsamide and after melarsen oxide than after mapharside.

The trypanocidal power of rabbit cerebrospinal fluid tested *in vitro* is greater after melarsen than after tryparsamide. Melarsen oxide, in common with other trivalent arsenicals, failed to render the cerebrospinal fluid trypanocidal. MSb was also inactive in this respect.

In prophylactic tests mice were protected for the remarkable period of 41 weeks after a single intraperitoneal injection of MSb. Comparable doses of suramin and pentamidine protected for only ten weeks and less than two weeks, respectively. In keeping with the prophylactic powers of MSb, the serum of a rabbit could be shown to be trypanocidal *in vitro* seven and a half months after a single subcutaneous injection of this substance. It is important to appreciate that the form of MSb recommended for use is a polymerized salt: the crystalline form has no significant prophylactic action [FRIEDHEIM, VOGEL and BERMAN, *J. Amer. Chem. Soc.*, 1947, v. 69, 560].

This laboratory work justifies further field trials of the new melaminyl compounds against *T. gambiense*, especially of melarsen for late-stage infection and of MSb as a prophylactic agent. *E. M. Lourie*

WILLIAMSON, J. **A Note on the Distribution and Excretion of Antimony in Mice treated with Sodium *p*-Melaminylphenylstibonate.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 209–12, 1 fig. [16 refs.]

Published work, for which references are given, leads the author to three general conclusions, as follows, on the distribution and excretion of organic antimonials:—

i. Pentavalent antimonials are more rapidly excreted than trivalent, though valency is not the sole determining factor.

ii. Antimony is concentrated in the liver.

iii. Trivalent antimony has a much greater affinity for blood-cells than for blood-plasma, whereas pentavalent antimony has little or no affinity for blood-cells.

In view of the remarkable prophylactic action of FRIEDHEIM's MSb in experimental trypanosomiasis [see ROLLO, WILLIAMSON and LOURIE, above] a study was made of the distribution and excretion of this drug in mice, in comparison with stibenyl, a representative aromatic antimonial of established repute. Antimony was estimated in the combined urine and faeces and in various organs, the assay technique being based on an adaptation by GOODWIN and PAGE [this *Bulletin*, 1944, v. 41, 20] of the semi-micro colorimetric method of CLARKE (*Analyst*, 1928, v. 53, 373).

After intraperitoneal doses of comparable size, only 54 per cent. of the antimony administered as MSb was excreted in five days, as against 96 per cent. of the antimony administered as stibenyl.

Tissue levels were higher after MSb than after stibenyl, and were maintained for a much longer period. In fact, after a dose of the size which protected mice for 287 days in the work of ROLLO, WILLIAMSON and LOURIE [*loc. cit.*] antimony was still found in the tissues on the 133rd day since injection, and, by extrapolation of the drug retention-time curve, it is evident that antimony remains in the liver or in the liver and intestinal tract, for about the period during which the mice were shown to be protected against infection. *E. M. Lourie*

LAUNOY, L. A propos de la prophylaxie chimique de quelques trypanosomoses expérimentales. [**Chemoprophylaxis of Trypanosomiasis.**] *Bull. Acad. Nat. Méd.* 1949, v. 133, Nos. 31/32, 617–20.

Further observations are reported on chemoprophylaxis against infection with the Yaoundé strain of *T. gambiense* in rats, by the oral administration of salts of pentamidine base.

The two salts used were the 2 : 2′-methylene-bis oxynaphthoate [this *Bulletin*, 1948, v. 45, 1071] and the penicillinate [this *Bulletin*, 1950, v. 47, 21]. With the first of these preparations, a dose of 0·005 gm. per 100 gm. body weight prolongs

the incubation period ; 0·025 gm. protects for 15 days ; 0·05 gm. for 30 days ; and 0·08 gm. for 40 days. With the other preparation, 0·035 to 0·05 gm. per 100 gm. body weight has protected for 14 to 27 days. In mice which this drug failed to protect, the infection lasted for many months, the maximum being 14 months ; controls died in an average of 46 days, the maximum being 120 days.

The paper includes information supplied by the Health Directorate of *France d'Outre-Mer* on the extent of " preventive lomidinisation " in French African territories, the expression evidently covering the use of either pentamidine (*i.e.*, the di-isethionate) or lomidine (*i.e.*, the dimethanesulphonate of pentamidine base).

In French West Africa 83,935 people had received this prophylactic treatment by the end of 1948, the dose being 3 to 4 mgm. per kg. body weight intramuscularly. The index of new infection was generally about 1 per cent. before prophylactic treatment, and it fell, practically everywhere, to about 0·05 per cent.

In French Equatorial Africa the number treated prophylactically between June 1946 and February 1949 was 46,255, of whom about 25,000 were treated in 1948. The dose now used, even for children of five years, is 5 mgm. per kgm. of the di-isethionate intramuscularly.

It is generally the practice to give a second injection six months after the first. *E. M. Lourie*

MORRIS, K. R. S. **The Science of Tsetse Control.** *Nature.* 1949, Dec. 31, 1114–15.

As an example of scientifically conducted tsetse control the author describes a method which has met with success in the Gold Coast. The method is called " selective clearing ".

The vectors of human trypanosomiasis are *Glossina palpalis* and *G. tachinoides* and continuous observation and recording over some years has shown that these flies spread along the rivers during the rains, but are concentrated in certain limited and well-defined foci during the dry season.

These foci are recognizable by the presence of certain trees and shrubs. An " indicator list " of these plants has been made and is used to identify the localities. At the time of the tsetse's greatest vulnerability the selected plants are removed and destroyed, the harmless ones are left and the tsetses, having now no dry season retreat, die out.

After a successful preliminary demonstration, this method of tsetse eradication was applied to the whole of the Lawra District and is now being applied to the remaining areas of endemic sleeping sickness in the Northern Territories of the Gold Coast where 2,300 square miles of country have been reclaimed. The French authorities are employing the same technique in the Upper Volta Territory and it is also being considered for Northern Nigeria. *H. S. Leeson*

See also p. 413, HADAWAY & BARLOW, **Further Studies on the Loss of Insecticides by Absorption into Mud and Vegetation.**

HAUSCHKA, T. S. **Persistence of Strain-Specific Behavior in Two Strains of *Trypanosoma cruzi* after Prolonged Transfer through Inbred Mice.** *J. Parasitology.* 1949, Dec., v. 35, No. 6, Sect. 1, 593–9, 2 figs.

" Two lethal, immunologically cross-reactive, and morphologically indistinguishable strains of *Trypanosoma cruzi*, originally isolated from human patients, were maintained for 28 and 41 months respectively by serial transfer through inbred male mice. The two strains exhibited well defined and constant

strain-specific levels of virulence, different degrees of affinity for certain host tissues, unequal susceptibility to the quinoline-derivative Bayer 7602, and a difference in response to environmental temperature."

TORRES, C. M. & DUARTE, E. Miocardite na forma aguda da doença de Chagas. [**Myocarditis in Acute Chagas's Disease.**] *Mem. Inst. Oswaldo Cruz.* 1948, Dec., v. 46, No. 4, 759–93, 14 figs. on 6 pls., 6 diagrams. [25 refs.]

The English summary appended to the paper is as follows :—

" The autopsy of a case of Chagas's disease or American trypanosomiasis (a girl, 5 years old), dead on the 22nd day of illness is reported.

" The anatomic diagnosis was as follows : Acute diffuse chagasic myocarditis. Chagasic encephalitis. Chagasic lymphadenitis of the right posterior auricular node. Tuberculosis of the bronchial and pulmonary nodes. Chronic passive hyperemia and atelectasia of the lungs. Chronic passive congestion and hemorrhages of the spleen. Serous hepatitis. Parotiditis. Edema of the right eyelids. Bilateral hydrothorax. Hydropericardium. Hydroperitoneum.

" The morphology of *Schizotrypanum cruzi* in the myocardium is considered. Besides agglomerates with typical small oval or round intracellular bodies, pre-flagellate and flagellate organisms, others are found in which the great amount of parasites and marked pressure exerted by them against each other render very difficult their identification ; sometimes the similitude of such agglomerates to Toxoplasma is striking. In such a case, the structure of the blepharoplast, usually preserved, is profitable and allows the identification of the pre-flagellate and flagellate forms of *Schizotrypanum cruzi.*

" Most of the small sensitive nerves in the epicardium show mononuclear infiltration of the perineurium (perineuritis).

" Microscopically there is extensive Zenker's degeneration and parasitism of the heart muscle fibers, marked cellular infiltration of the interstitial connective tissue, which are found in the ordinary musculature of every chamber of the heart as well as in Tawara's node, main bundle and right and left septal divisions of the bundle of His and perineuritis.

" Those anatomic changes are associated to an abnormal electrocardiogram presenting some similitude to that of an anemic infarct of the anterior wall of the heart and which will be discussed elsewhere (unpublished paper by Dias, Nobrega & Laranja)."

DE MENEZES, M. Miocardite chagásica crónica. Sua incidência no Brasil Central. [**Chronic Myocarditis in Chagas's Disease and its Incidence in Central Brazil.**] *Hospital.* Rio de Janeiro. 1949, Oct., v. 36, No. 4, 577–87, 6 figs.

The English summary appended to the paper is as follows :—

" The writer reports the study of 30 cases of chronic Chagas' disease. Fifteen cases showed right bundle-branch block, 3 cases showed complete A-V block and 14 cases presented ventricular premature beats. In no case left bundle-branch block was found.

" The analysis of 900 electrocardiograms showed that 110 patients had A-V blocks, 92 had right bundle-branch block and 183 had ventricular premature beats. Since these findings are quite common in chronic Chagas' disease, it is assumed that in many cases they are probably due to this infection, which is widely spread in Minas Gerais and Goiaz."

LEISHMANIASIS

BHENDE, Y. M., PURANDARE, N. M., BANKER, D. D., FIGUEREDO, N. & DESAI, S. D. **Kala-Azar : an Endemic Focus in Bombay.** *Indian Physician.* 1949, Oct., v. 8, No. 10, 296–304, 6 figs. (5 on pl.). [24 refs.]

Hitherto kala azar has apparently been confined to the eastern half of the Indian peninsula, to Bengal, Assam, Madras, Bihar, Orissa, and the eastern half of the United Province as far west as Lucknow; sporadic cases of doubtfully local origin have been reported from a few other places, *e.g.*, Goa. Bombay has, however, been considered entirely free from the disease until quite recently when a few sporadic cases have appeared. The present report deals with a small focus of indigenous kala azar in a Leper Home in Bombay.

From April 1948 to May 1949, 22 autopsies were performed in the Acworth Leper Home, Bombay. In 11 cases the diagnosis of kala azar was made by the demonstration of *Leishmania* in either smears or sections of the liver or spleen. This suggested the possibility of a local focus of kala azar.

There are 400 patients in the home. Of these, 357 were examined for splenic enlargement and their serum was tested by " Napier's aldehyde test ". Six patients were found to have enlarged spleens; of these three showed *Leishmania* on sternal puncture. Thirteen patients gave a strongly positive aldehyde test and 12 gave a weakly positive one; of these 16 proved negative to sternal puncture, in two *Leishmania* was found, and seven are still under investigation. Positive cultures on NNN medium were obtained in many cases.

In the 16 proven cases of kala azar, three patients had been born in Madras, an area where kala azar is endemic, one in Goa (but he had been in the institution 13 years), four in other non-endemic areas outside Bombay, and eight in Bombay Province. Five had been in the institution for three or more years.

Six species of *Phlebotomus* including *P. argentipes* have been found in Bombay.

The authors collected 32 " sand flies " from the vicinity of the Leper Home. Some of these were mounted, but the majority were dissected, smears were made from pharynx and mid-gut, and, it is claimed, four were found infected with leptomonads, which were identical with the forms seen in NNN cultures of *Leishmania.*

[The authors have made an important observation. Conditions for *Phlebotomus argentipes* are not very favourable in Bombay, but this sandfly has been found several times. One would therefore expect that kala azar might occasionally be transmitted. In an institution of this kind conditions would probably be most favourable for transmission of infection from an imported inmate infected with kala azar. Several of the patients had come from areas where kala azar is endemic.

The authors do not state the species of the four sandflies that they found infected. This finding must be accepted with reservation, since, even in the highly endemic foci in Bengal and Assam, sandflies naturally infected with *Leishmania* are rare; the identity of the flagellate forms that they found must be an open question.] *L. E. Napier*

CHEMNITZ, H. & KIRSCH, E. Beitrag zur Serologie und Pathologie der Kala-Azar. [**Observations on the Serological Pathology of Kala Azar.**] Reprinted from *Ztschr. f. d. gesamte Innere Med. u. ihre Grenzgebiete.* 1948, v. 3, Nos. 11/12, 336 [7 pp.], 4 figs. [48 refs.]

An account of clinical and pathological findings in a fatal case of kala azar. The diagnosis was confirmed after a long illness by the identification of

L. donovani in sternal marrow smears, and later, during the fatal relapse, in splenic pulp smears. Chopra's test and the formol-gel reaction were never found positive throughout the illness. Response to therapy was poor. Fouadin had no effect; there was a remission of some months after a course of stilbamidine; a brief respite followed a course of solustibosan, a second course having no effect, and the patient eventually died shortly after treatment with stibenyl-stibosan. Chopra's test and the formol-gel reactions were both negative within two months of death and an examination of plasma proteins at this time and at intervals subsequently showed low globulin values. A series of transfusions of blood and plasma improved the protein picture, but the total protein never rose above 5·75 gm. per cent.

Pathological findings included lung oedema, and enlargement of spleen and liver. Histological material was spoiled by being left too long after death before fixing, but organisms were found in the spleen and bone marrow and there was a notable absence of reticular hyperplasia in the spleen.

In an interesting discussion the authors point out the differences between the protein findings in their case and those reported by LLOYD and PAUL [this *Bulletin*, 1929, v. 26, 319 *bis*]. They consider that the consistent failure of the serum flocculation reactions, and the low protein values in their case indicate failure on the part of the reticulo-endothelial system to build up immune bodies against the infection.

This failure of the functional activity of the reticulo-endothelial system was ultimately responsible for the fatal issue. In the case described this dysfunction was present from the beginning and the authors consider that the history of repeated attacks of *P. falciparum* malaria shortly before the onset of kala azar indicates the reason for failure. They quote authority for the view that kala azar is often more severe in malarial patients, and that patients suffering from kala azar and who have recently had malaria commonly develop hypoproteinaemia. *B. G. Maegraith*

VARWIG, H. Ueber Eiweissstoffwechselstörungen bei Kala-Azar und Untersuchungen an einem eigenen Fall. [**Disturbances in Protein Metabolism in Kala Azar.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 205–19, 5 figs. [33 refs.]

This article is a long discussion of largely hypothetical character. For the metabolic changes which occur in a plasmocytoma the term "paraproteinosis" has been coined by Apitz. This comprises paraproteinaemia, paraproteinuria, and para-amyloidosis.

In this connexion the case is described of a man of 22 years who suffered for 1½ years from kala azar—though the diagnosis was in doubt till near the end between leukaemia, myelomatosis, lymphogranulomatosis and kala azar to account for the enlarged spleen. He had a severe epistaxis and by reason of the tendency to bleeding splenic puncture was decided against. When the patient's condition improved, operation was undertaken and profuse haemorrhage from the splenic vessels made splenectomy necessary. Death occurred a few hours later. The pathological anatomy of the various organs is described in considerable detail; the spleen showed abundant leishmania. Points indicative of albumin changes in plasma cells are vacuolation, basophilic staining of the plasma, the hyaline Russell bodies and fine crystalloid inclusions in the plasma. The paper contains photomicrographs of plasma and marrow cells. *H. Harold Scott*

FISCHER, O. & KRAUSE, G. Ueber einen eigenartig verlaufenden Fall von Mittelmeer-Kala-Azar. [**A Case of Mediterranean Kala Azar with Unusual Course.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Aug., v. 1, No. 2, 220–25, 3 charts.

Briefly, this is the account of the case of a soldier, 21 years of age, who was wounded in the chest, in Slovakia, and had a haemopneumothorax. Some months later he began to suffer from a low type of fever. Two years before, he had developed an adenitis beneath the jaw, the gland proving to be tuberculous. The fever was found later to be due to malaria and kala azar. The peculiar features of the case were the low grade of the fever and the long incubation period. The leishmanial infection did not show itself for 15 months after exposure and the malaria for 17 months. *H. Harold Scott*

WU, C. S. C., CHU, I. T. & WU, T. T. **A Case of Kala-Azar with Cirrhosis of the Liver and Jaundice.** *J. Path. & Bact.* 1949, Apr., v. 61, No. 2, 209–15, 4 figs. on 2 pls.

A Chinese male patient was admitted to hospital in Chungking with ascites and jaundice. The man had lived in Chungking, not a kala azar endemic area, for 1½ years but had previously lived in several endemic areas. There was no fever. The liver and spleen could not be felt on account of the general distension of the abdomen. There was no general glandular enlargement. The blood count showed a moderate degree of anaemia (3,600,000 red cells per cmm.) but a normal white cell count (8,400 per cmm.) ; there were, however, no eosinophils recorded. The patient died on the day after his admission.

A partial necropsy only was allowed ; this was done 15 hours after death. The liver (1,210 grammes) was macroscopically fibrotic. Histologically it was grossly disorganized with streaks of young fibrous tissue traversing the organ in all directions with infiltration of lymphocytes, plasma cells and large mononuclear cells. In many areas where the fibrous tissue predominated, only small isolated patches of parenchymal cells were seen ; these showed various degrees of atrophy. The fibrosis appeared to originate from the portal tracts, but there were innumerable extensions into the hepatic lobules and occasionally isolated patches of fibrosis appeared among the parenchyma cells. The sinusoids were in many places blocked with hypertrophied Kupffer cells. Under the high power it was observed that all the cyctoplasm of the phagocytes throughout the organ, and the Kupffer cells, were packed with *Leishmania*.

The spleen was enlarged (760 grammes). It was of a doughy consistency. The malpighian bodies were small and there were haemorrhages around the vessels of the fibrous trabeculae. The endothelial cells of the sinusoids were hypertrophied and were packed with *Leishmania* ; many cells were observed free in the sinusoids.

Leishmania were also observed in the phagocytes of the alveolar septa of lungs, in the endothelial lining of the kidney glomerular capillaries, in the mucosa of the small intestine (but not associated with some small ulcers here), and in the portal and pancreatic lymph glands.

The probable cause of the cirrhosis is discussed. The man is described as a " chronic alcoholic " : elsewhere it is stated " He had been in the habit of taking alcohol in small amount for many years—about two ounces of ' white wine ' a day ". [Many of us, better qualified, would resent the epithet.] The fibrous tissue was all newly formed and the authors feel that the whole condition was of recent origin. They conclude by suggesting that the *Leishmania* infection in combination with some other factor or factors was responsible for the condition. *L. E. Napier*

SEN GUPTA, P. C. **The Treatment of Kala-Azar and its Complications.** *J. Indian Med. Ass.* 1949, July, v. 18, No. 10, 377–82. [12 refs.]

This is an excellent account of the treatment of kala azar by a writer who has had exceptional experience. The paper does not lend itself to compression, but some outstanding points are selected.

Dietary restriction is not recommended ; in fact a full, balanced diet with a full complement of vitamins is important. A table shows the details of the administration of three pentavalent antimony and two diamidine compounds, namely urea-stibamine, neostibosan, antimony gluconate, stilbamidine isethionate, and pentamidine isethionate ; one or more of these drugs will meet the needs of all cases. The criteria of cure are given as (1) improvement in general health ; (2) subsidence of fever ; (3) decrease in the size of the spleen ; (4) increase in leucocyte count to five or seven thousand per cmm., and a marked improvement in haemoglobin level. [Parasitological criteria are not mentioned.]

For treatment of cancrum oris, one of the most fatal complications, he suggests penicillin intramuscularly and locally, specific treatment for kala azar, blood transfusions, and a good nourishing diet with all the vitamins, *plus* glucose intravenously if necessary. For kala azar complicated by tuberculosis, he suggests stilbamidine combined with streptomycin.

For " resistant " cases he considers stilbamidine the drug of choice, and recommends splenectomy if this fails. If splenectomy is performed, further specific treatment must be given. *L. E. Napier*

CHEN, T. T. **Rapid Treatment of Chinese Kala-Azar with Urea Stibamine. A Report of Twelve Cases.** *Ann. Trop. Med. & Parasit.* 1949, Oct., v. 43, No. 2, 174–81, 4 figs. on pl. [12 refs.]

Twelve Chinese patients in whom a diagnosis of kala azar had been made by sternal or splenic puncture were subjected to intensive treatment by intravenous urea stibamine. In one case the total dose was given by the continuous drip method, in a strength of 0·3 per cent. in 5 per cent. glucose saline ; in two the total dose was divided and three injections given daily for three days ; and in nine cases it was given in three single daily doses on three consecutive days. The total dosage varied from 1·2 grammes to 4·0 grammes : the patient in whom the continuous drip was used received 2·1 grammes.

Eleven of the 12 patients were cured. The 12th patient died on the " ninth day after treatment—presumably from poisoning with santonin ". One patient showed a poor response to the first course of treatment, but was cured by a second after seven days' interval.

There were no reactions in six cases, and slight reactions in the rest ; the reactions included nausea, vomiting, epigastric discomfort, slight tightness of the chest, numbness of the extremities, sweating, and oedema of the eyelids and lips. The patient receiving the continuous drip had rather more severe reactions, but they disappeared within 24 hours.

The temperature came to normal within 48 hours in seven cases. The size of the spleen was reduced to 5 cm. or less below the costal margin in ten cases within two months ; regression commenced within two weeks of the fall of temperature. The general condition improved in all cases and after an initial fall in weight during the first week of treatment, in six cases, the weight increased rapidly.

In 11 cases the sternal or splenic puncture smears became negative within 24 hours of the end of treatment, and in the other case after three days. No cultures were attempted. *L. E. Napier*

NAPIER, L. E. **Splenectomy in the Treatment of Kala-Azar.** *J. Trop. Med. & Hyg.* 1949, Dec., v. 52, No. 12, 243–8. [21 refs.]

In the pre-antimony days when there was no specific treatment, and the prognosis of kala azar was so bad that desperate measures would have been justified, the recovery rate after splenectomy was so low that the operation was not adopted to any great extent. Treatment by salts of antimony was introduced in 1915 and the synthesis of the pentavalent compounds in the 1920's, which gave improved results, pushed treatment by splenectomy further into the background. Between 1930 and 1935 several successful results of splenectomy in antimony-resistant cases of Mediterranean kala azar were reported. In 1939, however, the aromatic diamidines were introduced and proved very successful in resistant cases; nevertheless splenectomy was extensively practised on the Continent, no less than 30 cases having been reported from Spain and Portugal. In English-speaking countries interest was revived by a series of cases in which the spleen was removed in cases supposed to be splenic anaemia, which later turned out to be cases of kala azar. This led to deliberate removal in antimony-resistant cases of kala azar, three of which are detailed; one of these patients died subsequently. In discussing the rationale of splenectomy the author points out that kala azar is a general reticulo-endothelial infection and, although the spleen is the principal reticulo-endothelial organ, this tissue is distributed widely throughout the body; he also remarks that for each geographical area there appears to be a drug of choice. In Indian and Chinese kala azar the cure rate after one course of injections of the drug which has proved to be the most suitable for that area is of the order of 90 per cent., and in the Mediterranean and Sudanese varieties is 50 per cent., so that there would appear to be no justification for resorting to splenectomy in the ordinary untreated cases, even if it could be expected to effect a cure. In cases in which the drug of choice has failed to control symptoms, even after further treatment with an increased dose routine, and in which a change to other specifics has proved ineffective, it seems, in the author's opinion, justifiable to consider splenectomy, but a considerable series of successful cases would have to be reported to justify its general adoption. It should also be looked on not as a substitute for, but as complementary to, chemotherapy and at least one post-operative course of an anti-leishmanial drug must be given.

W. L. Harnett

RANQUE, J., RANQUE, M. & CABASSU, H. Le thymol test de Maclagan dans les leishmanioses humaines et canines. [**Maclagan's Thymol Test in Human and Canine Leishmaniasis.**] *C. R. Soc. Biol.* 1949, Aug., v. 143, Nos. 15/16, 1133–4.

The authors undertook a study of the thymol turbidity test in parasitic diseases in which the reticulo-endothelial system is more or less markedly damaged and for this purpose they chose sera from human and canine leishmaniasis and from rats infected with virulent *Trypanosoma brucei*. Brief details of the technique are given. In each case 0·05 cc. of the serum under test was added to 3 cc. of a saturated solution of thymol buffered to *p*H 7·8. Saline controls were also used. The readings were made with a Vernes photometer and green screen after 30 minutes on the bench. Results were recorded in Vernes units (U.V.), one of which is stated to be approximately 1/6 of a Maclagan unit.

The criteria were as follows :—

0–20	U.V.=negative
20–25	U.V.=doubtful
25–30	U.V.=" subpositive "
30	U.V.=positive

Ten human and 30 canine cases of leishmaniasis were studied and also a laboratory infection of rats with *T. brucei*.

In 8 human sera from cases of visceral leishmaniasis proved to have *L. infantum* in the bone marrow, strongly positive results (150–300 U.V.) were obtained. A typical formol-gel reaction was found in only two. Sera from 2 human cases of cutaneous leishmaniasis having *L. tropica* in the lesion, were completely negative (10–15 U.V.).

Of 30 sera from leishmaniasis in dogs, 28 were frankly positive (32–250 U.V.), one was "subpositive" (25 U.V.) and one was doubtful (22 U.V.). The formol-gel reaction was positive in 25.

All the 8 rats infected with *T. brucei* died in 5 days, with trypanosomes swarming in the blood: all were negative to the thymol test (4–12 U.V.).

The authors conclude that in man, the thymol test is one of the most useful presumptive tests for kala azar. It is held to be relatively specific and more sensitive than the formol-gel. It is suggested that in the more localized cutaneous form of the disease, modification of the "lipido protein complex" would not be expected and here negative results would occur.

The indices were less high in dogs except in acute cases: they were low in the predominantly cutaneous cases. There was less discrepancy with the formol-gel test than in the case of human sera.

In the *T. brucei* infections, death was so rapid from massive infection that modifications of the reticulo-endothelial system did not come into play and the test remained negative. [More extensive experimental evidence would perhaps be required before general conclusions could be drawn.]

H. J. O'D. Burke-Gaffney

i. LEFRANC, M. Leishmaniose cutanée et spécilline. [**Cutaneous Leishmaniasis and Specillin.**] *Algérie Méd.* 1949, Apr., No. 4, 153–4.

ii. ——. Leishmaniose cutanée. Essai de traitement par la pénicilline guérison par le Glucantime. [**Treatment of Cutaneous Leishmaniasis initiated with Penicillin and completed with Glucantime.**] *Ibid.*, Oct., No. 8, 331.

i. Oriental sore is common in certain parts of North Africa, but relatively rare in the neighbourhood of Algiers: the present case refers to a girl of 8 who had never left the environs of Algiers and who developed an oriental sore on the right cheek. *Leishmania tropica* was found in smears.

In view of the condition, age and sex of the patient, the author was anxious to undertake a treatment that would be the most rapid, least painful and disfiguring, and with little reaction. He decided against the use of mepacrine or Glucantime, on the grounds that the former may produce severe reactions and the latter is still more or less in the experimental stage. Recalling the success of CONSTANTINI (*Afrique Française Chirurg.*, 1947, Nos. 5/6, 295), who cured cases of oriental sore (accompanied by a surgical condition) with 50,000 units of penicillin in 4 days, the author undertook a similar treatment. The patient was given Specillin and on the 3rd day, after 300,000 units, the lesion improved dramatically.

This case was presented by the author on the fifth day of treatment when, after 1 million units of Specillin, the lesion had improved so remarkably as to suggest that it was healed.

ii. This paper was written six months after the above. The author now reports that the promising results of treatment were not maintained, and the lesion regressed to its original state with leishmaniae in smears.

He therefore gave the patient Glucantime [N-methyl-glucamine antimonate: 2168 R.P.: see this *Bulletin*, 1949, v. 46, 924, 1019]. The child weighed

20 kgm. and was given 2·1 gm. of the drug daily for 15 days, except that the first injection was half of this dose.

On the 9th day, some improvement was noted: by the 15th it was marked and on the 18th, clinical and parasitological cure were obtained.

The author suggests that penicillin is indicated in certain cases (*e.g.* on the nose or eye) where the troublesome features may be dealt with rapidly: but to obtain completed cure, other "more decisive but slower" treatment is indicated. *H. J. O'D. Burke-Gaffney*

HERTIG, M. **Phlebotomus and Residual DDT in Greece and Italy.** *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 773–809, 8 figs. on 4 pls. [28 refs.]

"In a number of countries residual DDT applied in various ways has been shown to give consistently good results in the control of *Phlebotomus*. The treatment of the inner walls of living quarters in all reported instances has given virtually complete protection from the bites of *Phlebotomus*, with usually no sandflies to be found in houses in daytime searches. A high degree of area control was secured. . . . DDT was also used successfully against sandflies by various German investigators during the war. These various studies, however, did not determine the degree of area control which would be produced by house spraying alone. Furthermore there had been few long-term observations in the temperate zone where many of the most important sandfly-borne disease problems occur, and where theoretically a single annual pre-season treatment ought to yield a high degree of control. It has been obvious for some time that the now standard method of house spraying for malaria control is also and automatically a method for the control of *Phlebotomus*. It has so happened, however, that in the urgency of the malaria work only casual attention has been paid to the fate of *Phlebotomus* in various campaigns in regions where these two problems coexist."

In these words the author summarizes the world situation regarding the effect of residual insecticide on *Phlebotomus* and, as in Greece a very extensive malaria campaign by modern methods had been in action for several years, the author spent five months of the summer of 1948 collecting data on the mainland of Greece, at the well-known focus of leishmaniasis at Canea in Crete and also in Italy and Sardinia.

The standard method of insecticide application was by hand pressure sprayers of water emulsions of DDT (2 gm. per sq. metre) to the inner walls and ceilings of houses, stables and other out-buildings.

In all areas investigated search was made for sandflies, and information was collected from inhabitants, who were quite familiar with the fly and able to differentiate it from the mosquito. A classification (Theodor) of sandflies of Greece is quoted; of the total 2,756 collected and examined, 1,940 were *Phlebotomus papatasi*. Detailed notes are given of observations and deductions in each area or village visited. Abstraction or summary of this mass of detail is not possible but the following extract is a typical one:—

"*Phlebotomus* in the District of Canea and also in other parts of Crete is clearly at a very reduced level of abundance compared with that prevailing in 1934 and 1935. The many solidly consistent reports of local residents leave no doubt that a sharp decrease occurred in 1946, and indeed began with the first actual spraying of the premises of the individuals concerned. This applies to all villages we visited and in part to the city of Canea. Even where the individuals' houses were not treated, a decline was reported as having occurred about that time and was associated by the people with the DDT which was being applied, usually somewhere in their neighburhood. The reports of the

people must be considered as relating chiefly to *papatasi*, since this species was the dominant one."

The status of leishmaniasis in Crete is summarized as follows :—

" A sharp drop in oriental sore with the development of relatively few cases in the last two years, coincided with the introduction of DDT in 1946.

Definite conclusions on leishmaniasis control must await long-term observations in endemic foci."

Final general conclusions based on this and previously published work are as follows :—

" Treatment of interiors with residual DDT gives immediate and virtually complete protection from sandflies indoors.

" House spraying alone, in compact communities, with an annual, preferably pre-season, treatment, eventually reduces the *Phlebotomus* population within the sprayed areas to near the vanishing point."

The author, working under the auspices of the World Health Organization, acknowledges indebtedness to a number of organisations, and many individuals, notably of the staff of the Athens School of Hygiene. *R. Ford Tredre*

FEVERS OF THE TYPHUS GROUP

PARROT, L. & PARROT, G. Sur la prémunition dans les rickettsioses. [**Premunition in Rickettsial Diseases.**] *Arch. Inst. Pasteur d'Algérie.* 1949, Sept., v. 27, No. 3, 257–61. [16 refs.]

The authors give a concise documented summary of the literature bearing on the mechanism of immunity in Q fever, scrub typhus, epidemic typhus, and trench fever. The 19 articles listed in the Bibliography have been reviewed in this *Bulletin*.

The authors justifiably claim that there is very strong evidence of the prolonged persistence in the body of the rickettsiae of the above diseases and of the maintenance of lasting immunity of the kind defined as premunition by Ed. SERGENT, PERROT and DONATIEN in 1924 [this *Bulletin*, 1924, v. 21, 492]. Killed vaccines are regarded as giving rise to premunition of much shorter duration. *John W. D. Megaw*

BIELING, R. & OELRICHS, L. Untersuchungen über die Antigenbeziehungen zwischen *Proteus X 19* und *Rickettsia prowazeki*. [**Investigation into the Antigenic Relationship between** *Proteus X 19* **and** *Rickettsia prowazeki*.] *Ztschr. f. Hyg. u. Infecktionskr.* 1948, Nov. 30, v. 128, Nos. 5/6, 586–90.

Rabbits were hyperimmunized by repeated injections of killed *Proteus X19*; their serum was found capable of inhibiting the infectiousness of *Rickettsia prowazeki* inoculated into the skin of susceptible rabbits.

John W. D. Megaw

TAMIYA, T., HAZATO, H., YAMAMOTO, T., SHIMOJO, H. & NISHIOKA, K. **Studies on the Antigenic Substance common to** *Proteus OX19, Rickettsia prowazeki* **and** *Rickettsia mooseri* (**Second Report**). *Japanese J. Exper. Med.* 1949, Sept. 30, v. 20, No. 2, 135–43. [12 refs.]

This is a highly technical study, the details of which cannot readily be abstracted.

The authors have found that the "Castaneda X" factor present in *Proteus OX19* and also in murine and epidemic rickettsiae, consists of two distinct factors, the "B_{III}" which is heat-stable and has "the nature of polysaccharide", and the "Z" factor, which is heat-labile and "seems to belong to protein."

John W. D. Megaw

SIEGERT, R. Das Rickettsientoxin als Ursache histopathologischer Organveränderungen. [**The Rickettsial Toxin as the Cause of the Histopathological Changes in Typhus Fever.**] *Ztschr. f. Hyg. u. Infektionskr.* 1948, Nov. 30, v. 128, Nos. 5/6, 477–85, 4 figs. [26 refs.]

The author describes the microscopical changes produced in the tissues of mice and rats by intravenous inoculation with suspensions of yolk-sac cultures of *Rickettsia prowazeki*. In animals sacrificed less than eight hours after the injection of lethal doses, changes were found which closely resembled those occurring in man in severe attacks of typhus fever. The paper is illustrated by photomicrographs showing the occurrence of typhus nodules in the brains of mice sacrificed five and eight hours respectively after inoculation, and also the occurrence of hyperplastic changes in the thyroid gland of a rat inoculated only half an hour before being sacrificed.

The chief lesions were endovasculitis and perivasculitis.

The findings are regarded as confirming the view that the rickettsial toxins play an important part in the pathology of typhus fever in man.

John W. D. Megaw

BIELING, R. & OELRICHS, L. Untersuchungen über die antiinfektiöse Wirkung von Fleckfieber-Rekonvaleszentenserum am Kaninchen. **The Anti-Infectious Effect of Convalescent Serum of Typhus Patients as observed in Rabbits.** *Ztschr. f. Hyg. u. Infektionskr.* 1948, Nov. 30, v. 128, Nos. 5/6, 624–9.

Injections of convalescent serum of typhus patients who had not been inoculated against the disease protected rabbits against infection with moderate doses of *Rickettsia prowazeki* injected intradermally. A much higher degree of protection was conferred by the serum of patients who had been vaccinated against the disease on one or more occasions.

There was no relationship between the Weil-Felix titre and the protective value of the sera; the titre was usually low in patients who had been vaccinated, yet the sera of these patients were strongly anti-infective.

John W. D. Megaw

BIELING, R. & OELRICHS, L. Untersuchungen über immunisatorische Beziehungen verschiedener Rickettsienstämme beim Kaninchen. **Investigation into the Immunological Relationships between Different Strains of Rickettsiae in Inoculated Rabbits.** *Ztschr. f. Hyg. u. Infektionskr.* 1948, Nov. 30, v. 128, Nos. 5/6, 649–53.

Well-authenticated strains of *Rickettsia prowazeki* and *R. mooseri* were tested. The sera of rabbits immunized by yolk-sac murine vaccine conferred as high a degree of protection to other rabbits against intradermal infection with *R. prowazeki* as against infection with the homologous, *R. mooseri*, rickettsiae.

So also rabbits immunized by louse vaccine (*R. prowazeki*) acquired the same moderate degree of immunity against the heterologous murine strain as they did against the homologous classical strain.

This paper was completed in 1944.

John W. D. Megaw

TRAVASSOS, J., PEREIRA, H. G. & VASCONCELOS, J. V. Tifo murino no Rio de Janeiro. II. Identificação da "Rickettsia mooseri" isolada de ratos naturalmente infectados. [**Murine Typhus in Rio de Janeiro.**] *Hospital.* Rio de Janeiro. 1949, Sept., v. 36, No. 3, 351–62. English summary.

From 81 rats caught in six different zones of Rio de Janeiro 15 pools of brain suspensions were prepared. Six of the pools included brains of rats which had given positive reactions with the complement-fixation and rickettsia-agglutination tests; from four of these pools *Rickettsia mooseri* was isolated. The other 11 pools did not include the brains of rats which reacted to the above tests but a few of the rats had given positive Weil-Felix reactions; from one of these pools, *R. mooseri* was isolated. *John W. D. Megaw*

DE MAGALHÃES, O. & ROCHA, A. Subsidio para o melhor conhecimento das doenças do grupo tifo exantematico no Brasil. [**Aid to the Better Knowledge of the Fevers of the Typhus Group in Brazil.**] *Brasil-Medico.* 1949, Aug. 6 & 13, v. 63, Nos. 32/33, 197.

The authors record very briefly the simultaneous occurrence of two different fevers of the typhus group in the same house in the centre of Ouro Preto, the ancient capital of Minas Gerais. The two patients were relatives who had not often been away from the locality; one of them had murine typhus, the other had the tick-borne typhus locally known as the neotropical typhus of Brazil. Investigations revealed that other cases of both kinds of typhus were occurring in the same locality. A further note on this remarkable focus of infection is promised. *John W. D. Megaw*

See also p. 356, MATILLA GOMEZ & PIEDROLA GIL, **Los roedores reservorios y vectores de enfermedades infecciosas y parasitarias. Estudio especial de ratas y ratones.**

KUDICKE, R. Ausbreitung und Bekämpfung des Fleckfiebers. Nach Erfahrungen im Generalgouvernement. [**The Spread and Control of Typhus Fever.**] *Schriftenreihe f. Seuchenbekämpfung.* Stuttgart. 1944, No. 1, 5–21, 1 chart.

WOHLRAB, R. Immunität und Schutzimpfungsverfahren bei den Erkrankungen der Fleckfiebergruppe. [**Immunity and Protective Inoculation in the Fevers of the Typhus Group.**] *Ibid.* 22–41, 1 fig. (map).

——. Prüfung von Fleckfieberimpfstoffen durch Feststellung des Aggluṭinintiters. [**Agglutination Tests in the Estimation of the Efficacy of Anti-Typhus Vaccines.**] *Ibid.* 42–9, 1 fig.

Chiefly of historical interest; published in 1944, and most of the substance of the articles has already been published. *John W. D. Megaw*

FREYGANG, F. Klinische, epidemiologische und serologische Beobachtungen bei Q-Fieber 1948/49 in Nord-Württemberg. [**Clinical, Epidemiological and Serological Observations on Q Fever in North Württemberg.**] *Deut. med. Woch.* 1949, Dec. 2, v. 74, No. 48, 1457–63, 3 figs. [26 refs.]

The author describes several outbreaks of Q fever which occurred between November, 1948, and May, 1949. In the first, and largest, of these there were 100 known cases in a rural population of about 3,000 persons living about 15 kilometres from Stuttgart. During the same period there was an outbreak affecting nearly half of the employees of a workshop 4 kilometres distant from the above locality.

The author investigated 72 cases on which he has based a good clinical description of the disease, including a detailed report on three cases studied in hospital. The diagnosis was confirmed in many cases by complement-fixation tests, which, however, at first gave rise to a good deal of confusion. When Q fever was first suspected sera of 23 convalescent patients, taken on the 14th to the 23rd days of the illness, were sent to the Bacteriological Institute at St. Gallen, Switzerland, and all were reported as negative for Q fever. Soon a report was received from the Hygiene Institute at Greifswald that *Rickettsia burneti* had been isolated from the blood of a patient and five samples of serum were sent to the laboratory of the University of California where all were found positive, at titres ranging from 1–16 to 1–256. Two of these sera were sent to St. Gallen and were reported as negative. The reactions observed at California were confirmed by identical findings at the Lederle Laboratories. A satisfactory explanation of the discrepancy in the findings is not available ; differences in the antigenic strains employed were regarded as the chief factor.

Three photomicrographs of rickettsiae isolated at Greifenwald are reproduced.

One of the patients had a mild encephalomeningitis which suggests that *R. burneti* has neurotropic properties in addition to its pronounced pneumotropic characters.

The paper is long and is packed with information interspersed with a discussion of the various aspects of the disease.

[It may be pointed out that the letter Q in the name stands for Query, not for Queensland as is assumed by the author.] *John W. D. Megaw*

MAYER, H. Beobachtungen zu einer Q-Fieber-Schlachthausepidemie in Württemberg. [**Observations on a Slaughter-House Epidemic of Q Fever in Württemberg.**] *Deut. med. Woch.* 1949, Dec. 2, v. 74, No. 48, 1476–7.

Within 18 days in April, 1949, at Esslingen, about 15 kilometres from the place where the large outbreak described in the preceding paper occurred, 28 persons were attacked by Q fever. All but four of the patients were butchers. In 17 cases complement-fixation tests were carried out and all were positive. Infection was believed to have been derived from the excrement of infected cattle, either through direct handling or by inhalation of droplets.

John W. D. Megaw

MANDERSON, W. G. **Q Fever. Report of a Case.** *Lancet.* 1949, Dec. 10, 1085–6. [15 refs.]

The diagnosis in this case was based on positive complement-fixation tests carried out on the 26th and 39th days by Dr. M. G. P. Stoker of the Department of Pathology, Cambridge University. The titre at each test was 1–80. The patient, presumably resident in or near Bristol, was admitted to the Ham Green Hospital, Bristol, in May, 1949, after having been ill for about seven days. Drenching sweats occurred about the 5th day and on the 7th day there was pronounced cough with blood-stained sputum. On the following day there was "frank haemoptysis of bright-red blood." The haemoptysis persisted for three days after admission to hospital, but otherwise the patient felt well and was afebrile. Signs of consolidation of the lower lobe of the right lung were observed and there was a moderate leucocytosis. Pneumococci were found in the sputum. An attempt is being made to trace the source of infection. *John W. D. Megaw*

BRAWLEY, R. W. & MODERN, F. W. S. **Q Fever in a Veterans' Hospital.** *Arch. Intern. Med.* 1949, Dec., v. 84, No. 6, 917–32, 4 charts. [Refs. in footnotes.]

This is yet another good clinical description of Q fever; it is based on a study of 12 patients coming from widely separated areas in Los Angeles County. An interesting point is that among the 93 patients admitted to the Veterans' Hospital with influenza-like symptoms or atypical pneumonia or fever of undetermined origin, during the 11 months September 1947 to July 1948, there were 20 cases in which the complement-fixation test for Q fever was positive; yet among 201 patients admitted during the succeeding period of 11 months with similar symptoms, only 6 gave positive reactions for the disease.

John W. D. Megaw

HAUSS, W. H. & SIMROCK, W. Über die Behandlung von Q-Fieber mit Aureomycin. [**The Treatment of Q Fever with Aureomycin.**] *Klin. Woch.* 1949, Dec. 1, v. 27, Nos. 45/46, 766–8, 3 figs. [13 refs.]

The author describes three cases of Q fever in which treatment with aureomycin was followed by prompt improvement in the subjective and objective manifestations of the disease. *John W. D. Megaw*

STRANDTMANN, R. W. **The Blood-Sucking Mites of the Genus** *Haemolaelaps* **(Acarina : Laelaptidae) in the United States.** *J. Parasitology.* 1949, Aug., v. 35, No. 4, 325–52, 45 figs. on 9 pls. [33 refs.]

Recent surveys in the United States in connexion with murine typhus and sylvatic plague have directed more attention than formerly to the blood-sucking mite parasites of small wild animals. The present paper is a valuable contribution to the systematics of the species of *Haemolaelaps* occurring in North America. Generic characters are given in detail and the specific illustrated descriptions for *H. megaventralis, morlani, geomys* and *glasgowi*, are accompanied by a host-list. *D. S. Bertram*

TRAUB, R. **Observations on Tsutsugamushi Disease (Scrub Typhus) in Assam and Burma. The Mite,** *Trombicula deliensis* **Walch, and its relation to Scrub Typhus in Assam.** *Amer. J. Hyg.* 1949, Nov., v. 50, No. 3, 361–70.

Many of the observations contained in this paper have already been described by the author in his contribution to the Preliminary Report on Tsutsugamushi Disease in Assam and Burma by MACKIE *et al.* [see this *Bulletin*, 1946, v. 43, 917 and 1132]. This more detailed description gives additional observations and data on the mite, *Trombicula deliensis* Walch, and its relation to scrub typhus in Assam. In the Ledo, Assam, areas there was a remarkably close association between the incidence of scrub typhus and the prevalence of *T. deliensis* which was present in every one of the 36 batches of mites from which rickettsiae were isolated, and which was present to the extent of 88 per cent. in these batches. The rat, *Rattus flavipectus yunnanensis*, was considered to be very important in the epidemiology of the disease. Shrews are perhaps involved in the epidemiology; they serve as hosts of *T. deliensis*, and two strains of rickettsiae were isolated from their mites. *T. deliensis* was much more prevalent in the wet season, but was found throughout the year.

John W. D. Megaw

GILES, H. McC. & SYMINGTON, T. **Chloromycetin in Scrub-Typhus.** *Lancet.* 1950, Jan. 7, 16–19, 3 figs.

In 15 out of 16 successive cases of scrub typhus the treatment consisted of a single dose of 3·0 gm. chloromycetin (chloramphenicol).

The remaining patient did not respond promptly to the drug and was given a further quantity of 2·25 gm. in divided doses.

The results of the treatment were very similar to those observed after the larger quantities of the drug usually prescribed. Apart from transient nausea no toxic effects were observed.

The duration of the fever after treatment ranged from 12 to 72 hours, the average was 26 hours. The treatment was given on the 4th to the 21st day of the illness, the average being 11·3 days.

The authors suggest that the single dose of 3·0 gm. is adequate unless there is no obvious improvement within 10 to 12 hours, in which case additional doses of 0·25 gm. may be given every three hours up to a total of 6·0 gm.

[No relapse appears to have occurred among the patients of this group, but the treatment was not given before the 7th day except in one case, whereas most of the relapses described by SMADEL *et al.* as occurring after larger doses appear to have been among patients treated within the first three or four days [see this *Bulletin*, 1949, v. 46, 1136 ; 1950, v. 47, 129].

It seems doubtful whether treatment within the first four or five days is desirable unless the patient is already seriously ill. The rickettsiostatic action of the drug probably interferes with the development of immunity, as has been suggested by Smadel.] *John W. D. Megaw*

BERGE, T. O., GAULD, R. L. & KITAOKA, M. **A Field Trial of a Vaccine prepared from the Volner Strain of** *Rickettsia tsutsugamushi*. *Amer. J. Hyg.* 1949, Nov., v. 50, No. 3, 337–42.

A scrub typhus vaccine was prepared from the lungs and spleens of white rats moribund from infection with the Volner strain of rickettsiae. The field trial was carried out in an area in Japan where the disease was known to occur every year.

Volunteers among the workers in the area were so numerous that only half of them could be vaccinated and every alternate applicant was given standard epidemic typhus vaccine. Three doses of each vaccine were given and the two groups were strictly comparable. Among 1,149 persons who received scrub typhus vaccine there were 9 cases with 5 deaths, and among 1,150 who were given the other vaccine there were 11 cases with 2 deaths.

Two of the deaths in the scrub-typhus group were attributed to an unorthodox treatment given by a local Japanese doctor who gave the patients several injections of heated suspension of testicles of rabbits infected with scrub typhus ; this caused violent reactions.

The trial showed that the vaccine had no effect in preventing or modifying attacks of the disease. *John W. D. Megaw*

ROSE, H. M. **The Clinical Manifestations and Laboratory Diagnosis of Rickettsialpox.** *Ann. Intern. Med.* 1949, Nov., v. 31, No. 5, 871–83, 5 figs. [Bibliography.]

Within three years of the discovery of rickettsialpox nearly 500 cases have been reported ; all of them from New York City.

The author describes the clinical and laboratory findings as observed in 35 cases studied at the Columbia Presbyterian Medical Centre.

The incubation period can seldom be ascertained ; in a laboratory infection the primary lesion occurred on the 7th day, and the temperature rose on the 10th day. In 24 cases there was one primary lesion, in 5 there were two. The lesion started as a small indurated erythematous patch with a diameter of 1·0 to 2·5 mm. ; soon a vesicle appeared at the centre and later there was an

eschar similar to the primary lesion seen in scrub typhus and occasionally in Rocky Mountain spotted fever. The lymph nodes of the region associated with the lesion were usually enlarged.

The onset of the fever occurred two to seven days after the detection of the lesion. Malaise and headache occurred in every case; nearly all the patients had chilly sensations; about half of them had shaking chills, sometimes accompanied by drenching sweats.

On the first to the seventh day of the fever, most often on the second day, the rash appeared in the form of discrete erythematous maculo-papular spots 2 to 10 mm. in diameter and distributed all over the body. Usually a vesicle appeared in the centre of each spot; sometimes the vesicles became so large as to simulate the rash of chickenpox. Sometimes there was itching. At a later stage the vesicles were replaced by blackish crusts which dropped off, leaving a pigmented spot, but never a scar.

Among 28 cases in which leucocytes were counted the total count ranged between 2,500 and 5,500 per cmm. in 21, and in two there was a moderate leucocytosis. The differential count was normal except in six cases in which there were "a number of" large vacuolated mononuclear cells like those seen in infectious mononucleosis.

The Weil-Felix reaction with *Proteus OX19* and *OXK* strains was always negative.

Complement-fixation tests, in which ether-extracted soluble antigens were used, gave rising-titre responses in all the cases tested; the titres ranged between 1–64 and 1–256 in seven cases tested between the 21st and 45th days; in the remaining case, tested on the 12th day, the titre was 1–16. The reaction with Rocky Mountain spotted fever antigen was always positive; in three cases the titre was higher than that with the homologous antigen and in one it was the same.

Attempts were made to isolate rickettsiae in 10 cases, and in eight of these Swiss mice inoculated with 0·5 to 1·0 cc. of fresh blood became infected. Primary yolk-sac inoculation was successful in only one case, and none of the 10 guineapigs that were inoculated gave any response.

Primarily inoculated mice rarely died, but when sacrificed on the 8th to the 10th day it was easy to demonstrate rickettsiae in smears of the liver, spleen and intraperitoneal fluid. In subsequent passages most of the guineapigs died and it became easy to establish yolk-sac cultivation of the rickettsiae.

The rickettsiae were extracellular, intracytoplasmic and intranuclear. The intranuclear distribution is not clearly shown in the photograph reproduced.

John W. D. Megaw

BARKER, L. P. **Rickettsialpox: Clinical and Laboratory Study of Twelve Hospitalized Cases.** *J. Amer. Med. Ass.* 1949, Dec. 17, v. 141, No. 16, 1119–23, 3 figs.

This clear and concise description of rickettsialpox is based on a study of 12 cases. The clinical features of this group of cases conformed to the general pattern described by previous observers.

The serological findings differed in one important respect from those reported by ROSE [above]. In the present series, only four of the patients' sera contained complement-fixing antibodies against Rocky Mountain spotted fever antigen and the titres observed in these sera were "not sufficiently high to be considered positive."

In seven cases there was leucopenia (2,400 to 4,000 per cmm.) and in two cases there was leucocytosis (12,000 to 15,000).

The paper contains a useful summary of existing knowledge of the clinical aspects of the disease.

John W. D. Megaw

WOLFF, W. A. & HARRELL, G. T. **Liver and Kidney Function in Rocky Mountain Spotted Fever.** *Amer. J. Med. Sci.* 1949, Nov., v. 218, No. 5, 500–509. [31 refs.]

During the six years, 1942–1947, the author studied 26 cases of Rocky Mountain spotted fever; 16 of the patients were children, and three of these died.

Full details are given of the systematic investigation of the liver and kidney function at various stages of the illness.

There was evidence of functional liver damage which was roughly in proportion to the severity of the illness; it was most clearly shown by the hippuric-acid secretion test, but was also demonstrated by the bromsulphthalein and van den Bergh tests. There was always a complete restoration of the function during convalescence.

Functional renal damage was observed occasionally, in the form of reduced urea clearance and transitory albuminuria. Azotaemia, which commonly occurred, was not believed to be associated with kidney damage. The kidney function soon returned to normal in every case, and the changes observed were not significantly different from those common in many infectious diseases.

During part of the period of the enquiry the patients received a high-protein diet, by forced feeding when necessary; this was regarded as protecting the liver against functional damage; it did not alter the function of the kidneys, though "it might temporarily overload them." *John W. D. Megaw*

GAUD, M. **The Rickettsioses in Equatorial Africa. "Congolese Red Fever."** *Bull. World Health Organization.* Geneva. 1949, v. 2, No. 2, 257–70, 1 fig. [57 refs.]

This is a critical, and fully documented, review of the extensive literature which bears directly or indirectly on the controversial subject of "Congolese red fever." The author shows that the name Congolese red fever has been given to dengue and to three different fevers of the typhus group, "classical or louse-borne typhus, murine or flea-borne typhus, and boutonneuse or tick-borne typhus." He therefore concludes that the name leads to confusion and should no longer be used.

The author states that the proved existence in central Africa of the above three types of typhus fever demonstrates the uniformity of the pattern of these fevers throughout the African continent, but in another place he states that there is no relation between tick-bite fever and Rocky Mountain spotted fever whereas there is a group affinity between the latter disease and boutonneuse fever. Admittedly there is still much to be learned with regard to the relationship between the different tick-borne typhus fevers but many workers will probably hesitate to say that they are not related to each other despite certain antigenic differences.

The paper should be read by all medical men, not only in central Africa, but also in the many areas in which there are perplexing problems connected with the diagnosis and classification of the local fevers.

The first of the African fevers discussed by the author is the one described in 1921 by DAVIES and JOHNSON [this *Bulletin*, 1922, v. 19, 67] as "Twelve-Day Fever of Dengue Group in Nigeria" and by CLAPIER in French Equatorial Africa [*ibid.*, 66]. This fever is of special interest to the reviewer, who at the time wrote a note in which he showed that the disease was quite different from dengue and that it closely resembled the fever of the typhus group which he had recently described and classified provisionally as tick typhus [*ibid.*, 67].

John W. D. Megaw

RABIES

BÉQUIGNON, R. & VIALAT, C. Les vaccinations antirabiques à l'Institut Pasteur en 1948. [**Anti-Rabies Vaccination at the Pasteur Institute in 1948.**] *Ann. Inst. Pasteur.* 1949, Dec., v. 77, No. 6, 757–61.

This Report follows the lines of its predecessors [see this *Bulletin*, 1949, v. 46, 736]. During the year, 407 people reported for treatment and 150 were judged to require it. Treatment consisted of daily injections of the antirabic vaccine prepared at the Institute and was given for 15, 18, 21 or 25 days according to the severity of the bite. It is noted that this was the 1,811th passage of the virus used.

The animals incriminated were 134 dogs, 15 cats and a ferret: only one animal each fell into categories A and B, the remainder were suspected of rabies only.

The wounds in the affected persons were deep in 116 cases and superficial in 34: in 111 they were on bare skin, and in 39 clothing intervened. The head, upper limbs, trunk and lower limbs were bitten respectively in 8, 82, 2 and 58 cases.

In 114 cases, treatment was begun within seven days of the bite, in 26 within 21 and in ten after 21 days.

There were no deaths and no paralytic accidents were reported after 6 months' observation.

It is added that supplies of phenolized vaccine were provided for British and United States Army medical authorities and for veterinarians.

H. J. O'D. Burke-Gaffney

BOCCALANDRO, C. A. & ESQUIVEL, R. B. Sobre el problema de la rabia: exposición de un plan organico de lucha. [**The Rabies Problem: Organization of Measures for dealing with it.**] *Rev. Asoc. Med. Argentina.* 1949, Nov. 15–30, v. 63, Nos. 665/666, 544–52, 3 graphs & 9 figs. [10 refs.] English summary.

Rabies and the risk of rabies infection constitute no light problem in Buenos Aires. The prevalence of the disease seems to come and go in cycles. There was a rise, almost a steady rise, in the period 1928–38, from 29 to 139 cases; during the next five years a fall to 17 and, since then, another rise, the figures for the five years 1943–47 being 17, 48, 40, 66 and 104 respectively. In 1948 the number had again dropped, to 60, but in that year more than 10,000 dogs had been vaccinated.

The numbers of persons bitten by dogs, rabid or suspected of being rabid, were: 1944, 711 and in 189 the animal was proved to be rabid; in 1945, 795 and 280 rabid; in 1946 the figures were 1,167 and 363; in 1947, 1,329 and 427, and in 1948 1,182 and 405.

The campaign comprises three main features: (1) Education of the people by placards, films and radio talks, telling them how to recognize a rabid animal, especially one with the dumb paralytic form; (2) Restriction of the free roaming of stray dogs about the streets, the capture of ownerless dogs and their destruction if they are not claimed within a specified time; (3) Vaccination, compulsory but free, of all dogs. It is hoped that compulsion will not be needed when the results of the first measure for spreading knowledge of the disease among the people gains ground.

H. Harold Scott

PLAGUE

KAUL, P. M. **Prevalence of Plague in the World in Recent Years.** *Epidemiological & Vital Statistics Rep. W.H.O.* 1949, Aug., v. 2, No. 8, 142–62, 2 graphs & 2 maps. [In parallel French & English.]

This paper contains the available statistics showing the prevalence of plague all over the world from 1939 to 1948, inclusive, and also the monthly incidence in each country from 1945 to 1948 ; in some cases also up to the middle of 1949.

A map shows the geographical distribution during the years 1945 to 1948. The author gives a concise summary of the chief trends of incidence in recent years for each country.

On the whole the story is one of retrogression ; active foci are now restricted to : (1) The Asiatic countries, India, Burma, Siam, Indo-China, Java, and China ; (2) African countries, the Azores, South-West Morocco, Senegal, Kenya, Tanganyika, the Belgian Congo, Madagascar, and South Africa ; and (3) The South-American countries, Peru, Brazil, Bolivia, and Argentina.

Sylvatic plague tends to spread in North and South America and in South Africa.

Egypt has been free from plague in 1948 and had only one small outbreak in Alexandria in 1947. Kenya is now nearly free, even in areas in which no control measures have been carried out. In South Africa sylvatic plague is widespread and is extending, but there were only nine cases of human plague in 1947. In India there was an alarming recrudescence, reaching a peak of 89,561 cases in 1947 in British India and nearly 13,000 cases in the Indian States, but in 1948 there was a sharp decline to less than 27,000 cases and just over 5,000 cases in these two areas, respectively. Pakistan is shown as having been entirely free from the disease in 1947 and 1948. Information from China is incomplete, reports were received from only ten provinces, but there seems to have been a sharp decline in 1947 and 1948. The appearance of the disease in Hunan in 1941 is attributed to bacterial warfare, but there were only 102 cases in the three years in which the disease occurred. A severe outbreak, mostly of the pneumonic type, occurred in North-West China in 1942. Burma and Java are still severely affected.

In Madagascar, which was severely attacked during the years 1933 to 1935 inclusive, the incidence fell sharply after the introduction of mass inoculation with Girard's live vaccine and has remained at a low figure ever since.

Argentina has widespread sylvatic plague but the human cases in the three years 1946–48 have been only ten, four and 12 respectively. In Brazil where sylvatic plague is very common there were 391 human cases in 1948. In Peru which had been heavily affected since 1903, there has been a marked decline to 73 cases in 1948, and in one area striking success is believed to have followed the systematic use of DDT and the rat poison " 1080 ". In the U.S.A. where sylvatic plague is extensive and is still spreading there have never been more than three cases in any year since 1939.

In some countries the case fatality rate in recent years has been surprisingly small ; for example in Brazil since 1946 it has been less than 20 per cent. in each year, and in Peru in 1946 there were only 20 deaths in 126 cases. In India in 1945 there were 29,751 deaths and 35,281 cases ; in 1948 there were 9,757 deaths and 26,820 cases.

The tables would be greatly improved by the inclusion of approximate estimates of the population of each of the areas for which statistics are given.

John W. D. Megaw

GARNHAM, P. C. C. **Distribution of Wild-Rodent Plague.** *Bull. World Health Organization.* Geneva. 1949, v. 2, No. 2, 271–8.

The author begins by admitting that the name wild-rodent plague is not comprehensive because shrews, opossums, and even carnivora, may be affected, but he regards sylvatic or selvatic plague as a misnomer because the disease is not one of forests. Yet he uses the name sylvatic plague freely in the article and is justified in doing so because the Latin word *silvaticus*, when used of animals, means wild and therefore the name sylvatic plague is quite appropriate. Selvatic, the word employed by Ricardo Jorge, is the Portuguese rendering of the word and strictly speaking has precedence over sylvatic.

The foci of sylvatic plague are described as being of two kinds : (1) the type in which wild rodents are primarily involved, as is the case in the foci of Central Asia, and (2) the type in which infection has spread to the wild rodents through contact with rats in ports, etc., as happens in South Africa, California, and South America.

Lists are given of the animals of the wilds, known to be, or strongly suspected of being, reservoirs of infection in the different areas. The foci in Siberia and Mongolia which formerly were associated with large-scale epidemics appear now to be quiescent, but foci in South-East Russia associated with *Citellus pygmaeus* are still active.

In India and Ceylon sylvatic plague is not an important disease, though wild rodents become infected at times through contact with domestic cats. In South Africa plague spreading from the rats of the ports has caused nearly a thousand outbreaks in rural areas. In nearly every part of the Union gerbils are the chief reservoirs and have also been responsible for outbreaks affecting more than 300 persons in Bechuanaland and the Rhodesias.

In the Belgian Congo there were 65 human cases near Lake Albert in 1939. In the rest of Africa the disease appears to be absent or unimportant.

In North America the disease spread early in the present century from domestic rats of San Francisco to the ground squirrels of California where many human cases occurred. The disease now extends to many States, and a few human cases have occurred in Nevada, Oregon, Utah, Idaho, and even in Alberta in Canada.

In South America " appalling epizootics " have occurred among field rodents in Argentina and there have been many human cases of sylvatic plague. Guineapigs and cricetids are the chief reservoirs of infection. In Brazil plague is said to be still a dangerous menace, but no mention is made of the extent to which sylvatic reservoirs of infection are responsible. The disease occurs but does not appear to be of serious importance in other countries of South America.

John W. D. Megaw

DAVIS, D. H. S. **Plague Survey : Barotseland.** *Northern Rhodesia Health Dept. Ann. Rep. 1946.* Appendix I. pp. 49–57.

This survey was carried out in the months of July and August, 1946, and apparently was a purely precautionary measure because Northern Rhodesia has been free from plague except for two outbreaks in 1917 and 1918 with 96 and 93 cases respectively and few small outbreaks in 1937 and later years. No case has been reported since 1944. [From the official reports it appears that there were eight cases in 1948.]

In spite of the shortness of the time at his disposal the author has prepared a clear and comprehensive appreciation of the sylvatic-plague situation in the area. He mentions the places in which conditions are favourable for the establishment of the disease and describes the precautions needed for the

prevention and control of infection. He doubts whether the risk is so great as to justify elaborate measures except in one area in which there was a suspicion that the local rodents might already be infected.

Gerbils, the chief wild-rodent reservoir, and multimammate mice, the chief intermediary between domestic and wild rodents, were numerous in one area.

The chief methods recommended for dealing with outbreaks of plague in man or animals are the application of DDT powder to the floors of huts, rat burrows, and grain bins ; also to the clothing and bodies of the inhabitants ; the next step is a campaign against rats in the villages and gardens, followed by a repetition of DDT dusting. *John W. D. Megaw*

ISSALY, A. S. & DE ISSALY, I. S. M. Una modificación del líquido de Broquet para la mejor conservación de la vitalidad y virulencia del Bacilo pestis en órganos pestosos. [**A Modification of Broquet's Fluid for the Better Preservation of the Viability and Virulence of the Plague Bacillus in Infected Organs.**] *Rev. Inst. Bacteriológ. Malbrán.* Buenos Aires. 1949, v. 14, No. 1, 191–201, 1 chart.

Broquet's Fluid consists of (1) Pure neutral glycerine, 20 cc., (2) Calcium carbonate (precipitated chalk), 2·0 gm., and (3) Distilled water to make up to 100 cc. This fluid was sterilized at 110°C. for ten minutes and stored in bottles whose corks were sterilized by dry heat and impregnated with sterilized melted paraffin ; it was found by tests to be suitable for preserving the virulence of plague bacilli contained in the spleen or, preferably, bone marrow of infected guineapigs which had been freshly killed.

The author found that the period of survival of the bacilli was considerably lengthened by the addition of (*a*) Bisodium acid phosphate, 1·104 gm., and (*b*) Citric acid, 0·023 gm.

Spleens of infected guineapigs, removed two days after death from plague infection, remained infective for 15 days in the fluid. *John W. D. Megaw*

PANJA, G. & GUPTA, S. K. **Diagnosis of Human Bubonic Plague by Agglutination Test.** *Indian Med. Gaz.* 1949, Sept., v. 84, No. 9, 383–4.

The authors describe a simple slide-agglutination test which they regard as being helpful in the diagnosis of bubonic plague. They employ one-day or two-day agar or blood-agar cultures of *P. pestis* grown at a temperature of 37°C. ; these cultures are rubbed vigorously into serum, diluted 1–3 or 1–4, on a glass slide.

The authors state that " only one strain should not be employed for the test ".

Among 17 cases bacteriologically positive on blood culture the agglutination test was positive in 15, which were tested on the fifth to the seventh day ; the two negative reactions were in sera tested on the third and fourth days. In 11 bacteriologically negative cases the reaction was positive in tests carried out on the fourth to the 14th day. In 75 normal control sera the reaction was invariably negative.

Examination of fluid obtained by puncture of the bubo is regarded as an essential method of diagnosis.

The Report of the German Plague Commission of 1899 is quoted as stating that the agglutination test for plague can be accepted when positive, but is meaningless when negative.

The Report of the Haffkine Institute of Bombay 1936, is also quoted ; in this the test is described as not being sensitive enough for diagnosis.

John W. D. Megaw

SEAL, S. C. & PRASAD, G. **Further Notes on the Incidence of Pneumonic Plague Cases in Gaya (Bihar).** *Indian Med. Gaz.* 1949, Sept., v. 84, No. 9, 408–13, 1 map.

The authors have made a detailed epidemiological investigation into the outbreak of pneumonic plague mentioned by one of them in a previous paper [see this *Bulletin*, 1949, v. 46, 934].

Six out of seven pilgrims from the Punjab who had just arrived in Gaya, Bihar, died, presumably of pneumonic plague, between the 23rd and 29th December, 1948. A local homœopathic practitioner visited the patients on or about 23rd December; two days later he was attacked and after an illness lasting two days he died. Among the many persons who came into contact with this patient ten were attacked on or about 31st December and all died after illnesses lasting two to four days. Although many persons came into close contact with these patients the only further case was that of a child who was attacked on 5th January, but recovered after streptomycin treatment.

On 2nd January anti-plague inoculation was started and energetic steps were taken to isolate the residents of the four houses in which the patients had lived and to treat the houses and surroundings with DDT. The authors state that "the health authorities necessarily attributed this success [the arrest of the epidemic] to the prompt and drastic anti-plague measures mentioned above".

[There does not seem to be much justification for the view just quoted. Except for the child all the patients had died before the control measures could possibly have become effective. This comment must not be regarded as implying criticism of the action of the health authorities who acted with commendable zeal and promptness.] *John W. D. Megaw*

CHEN, R. T. S. **Streptomycin in Bubonic Plague.** *Chinese Med. J.* Shanghai. 1949, Aug., v. 67, No. 8, 442–3.

"Streptomycin treatment of three severe cases of bubonic plague not responding to sulfadiazine resulted in dramatic recovery. Whereas the effect of streptomycin on the general condition of the patient was remarkably good, the buboes appeared to be little influenced and often required incision and drainage as pointed out by other observers."

MATILLA GOMEZ, V. & PIEDROLA GIL, G. Los roedores reservorios y vectores de enfermedades infecciosas y parasitarias. Estudio especial de ratas y ratones. Desratización en la ciudad y en el campo con los nuevos raticidas sintéticos. [**Rodent Reservoirs and Transmitters of Infectious and Parasitic Diseases. A Special Study of Rats and Mice. Rat Control in Town and Country with the New Synthetic Rat Poisons.**] 98 pp., 26 figs. [Bibliography.] 1950. Madrid: Instituto Español de Medicina Colonial.

This little book contains all, or nearly all, that every doctor and health officer in Spain ought to know about the rodents that are concerned with the harbouring and transmitting of diseases to human beings. Rats and mice, naturally receive far more attention than the other rodents. The section dealing with rat-proofing and with rat destruction by trapping and poisoning is specially useful; it contains information regarding the modern rat poisons that is not readily available elsewhere. *John W. D. Megaw*

CHOLERA

SENECA, H. & HENDERSON, E. **Laboratory Diagnosis of Cholera.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 921–4.

In carrying out the routine examination of stools for *V. cholerae* during the 1947 epidemic in Egypt, the authors did not use any of the usual differential media. From an eight-hour peptone water culture at *p*H 8·4 ordinary nutrient agar plates at the same reaction were streaked, and after overnight incubation colonies were picked off for agglutination tests with O sera. If agglutinable, the cultures were tested for production of haemolysin to differentiate El Tor strains. A special method of isolation developed by Dr. Sven Gard of the State Bacteriological Laboratories, Stockholm, is described. A strip of filter paper impregnated with cholera O agglutinating sera is placed in one side of a flask containing a special semi-solid medium with 0·35 per cent. agar and a stool inoculum is introduced on the other side. If cholera vibrios grow on incubation they migrate in the thin agar to the impregnated strip where they form a perceptible cloud.

By the methods employed by the authors *V. cholerae* was isolated from the stools only in the earliest days of the attack. Stools became, and remained, negative after the fifth day. In carriers the organism remained for less than 24 hours in the stools. "For purposes of laboratory diagnosis *V. cholerae* can be isolated within the first 24–48 hours of illness and occasionally as late as the 5th to 7th day. In contact carriers also *V. cholerae* can be isolated soon after contact but disappears rapidly from the intestinal tract."

In the course of examination of 3,000 contacts, *V. cholerae* was found in the stools of 61. Of these one developed a typical clinical attack and a second had symptoms of mild cholera. It is considered that the healthy contact carrier may be an agent in the spread of infection.

No definite evidence was obtained as to whether chemotherapeutic sterilization can be obtained by the use of sulphonamides as most of the carriers rapidly became free of the vibrio whether they were treated or not. The use of a soluble non-absorbable sulphonamide is however advised provided it can be given very early in the attack. It will have no value after the third day.

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SIGALAS, R., PAUTRIZEL, R. & NOGUÈS, C. Etude du parasitisme intestinal chez les enfants de la région bordelaise. [**Intestinal Parasites in Children in the Bordeaux Area.**] *J. Méd. de Bordeaux.* 1949, Dec., v. 126, No. 12, 626–8.

The authors open by observing that inadequate living conditions and malnutrition in recent years have increased the number of intestinal parasitic conditions seen.

They therefore made a parasitological study of 120 children between the ages of 2 and 15 in the surgical wards of a Bordeaux hospital : they were almost healthy so far as debility arising from infectious diseases was concerned.

Three specimens were taken from each child at intervals of eight days : the examination consisted of direct smears, warm stage preparations, concentration and stained preparations. In the case of examinations for *Enterobius*, a cellulose tape method was employed.

The results are shown in a table. The findings include *E. histolytica* (9·7 per cent.), *Giardia intestinalis* (36·2), *Chilomastix mesnili* (14·0), *Endolimax nana*

(0·8) ; and among the helminths *Trichuris* (61·0 per cent.), *Enterobius* (54·5) and *Ascaris* (25·6). *Entamoeba coli* and *E. hartmanni* accounted for 54·8 and 34·5 per cent.

Multiple infections were common : only 17 of 99 children having parasites showed single infections. In all 87·6 per cent. of children were infected. It is stated that recent findings in Lille by COUTELEN and his co-workers showed parasitic infections of about 68 per cent. (range from 44 to 73), that is, considerably lower than the present findings.

It is noted that one child carried embryophores of *Taenia saginata* and that two cases were seen of pseudo-parasitism by *Dicrocoelium dentriticum*.

H. J. O'D. Burke-Gaffney

BURLINGAME, P. L. & GARDNER, H. T., with the technical assistance of G. RESEMANN, J. CRANMER & Eleonore VOLLMER. **Intestinal Parasitism in American Troops in Germany. Relation to Transmission of Viral Hepatitis.** *J. Lab. & Clin. Med.* 1949, Sept., v. 34, No. 9, 1284–9. [13 refs.]

As a part of a study on the transmission of virus hepatitis, an investigation on intestinal parasitism was carried out. The data obtained did not contribute anything to this study, but are interesting from another point of view, in that they show a very high rate of parasitism in each of the groups examined. The groups were 212 American soldiers with hepatitis, 111 soldiers from an orthopaedic centre at Stuttgart, 134 soldier patients in a Berlin hospital (cases of hepatitis excluded), 187 presumably healthy soldiers from the same hospital, and 1,705 indigenous persons employed in Army messes in Germany. One stool specimen after saline purgation was examined from each person, by three techniques (1) iron-haematoxlyin stained smears, (2) zinc sulphate centrifugal concentration, and (3) thick faecal smears dehydrated and cleared with xylol.

The findings included *Entamoeba histolytica, E. coli, Endolimax nana, Iodamoeba bütschlii, Dientamoeba fragilis, Giardia, Chilomastix, Ascaris, Trichuris, Enterobius, Hymenolepis nana*, hookworm, *Strongyloides*.

The number of infections found were 602 in 644 soldiers, and 2,678 in 1,705 local personnel, with 55 per cent. of the former and 78 per cent. of the latter infected. As is suggested from the total infection, each parasite showed a higher infection rate in the local persons than in the American soldiers, with a few exceptions, a notable one being hookworm which was 5 per cent. in the soldiers and 0·1 per cent. in the local persons. Strongyloides were 0·1 per cent. in each group. There were no material differences in the infection rates between the four soldier groups, but the Stuttgart group showed the highest rate.

The figures for *Entamoeba histolytica* were 11 per cent. of soldiers, 25 per cent. of local personnel. Of those with *E. histolytica* 31·4 per cent. gave a history of diarrhoea, compared with 10·1 per cent. for the whole group of soldiers.

Of the soldiers, 38·8 came from south-eastern States, and 16·8 had had tropical service. The length of stay in Germany made no difference to the degree of parasitization ; the figures were, respectively, 50, 55 and 48 per cent. for one year or less, one to two years, and over two years' residence. *L. E. Napier*

VAN RAALTE, H. G. S. **Chronic Amebic Abscess of Liver and Aspiration Liver Biopsy.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 881–7, 4 figs. [11 refs.]

" Occasionally single large chronic amebic abscesses of the liver do not present classic diagnostic symptoms. In two such cases a diagnostic liver aspiration-biopsy disclosed the abscesses, which were further treated by a single aspiration, instillation of emetine and penicillin in the abscess cavity and subsequent

routine anti-amebic treatment with emetine, chiniofon and carbarsone with penicillin intramuscular injections as an adjunct. Both patients recovered completely. Puncture through the sinus pleurae and diaphragm in the posterior axillary line is recommended."

PLA, J. C. & MUÑOZ MONTEAVARO, C. Amibioma del colon. Enfermedad de Gaminara y Lasnier. [**Amoeboma of the Colon.**] *Arquivos Uruguayos de Med., Cirug. y Especialidades.* 1949, July, v. 35, No. 1, 1–15, 4 figs. [15 refs.] English summary (8 lines).

Three cases of amoeboma of the colon in Uruguay are presented by the authors, in men of 33, 66 and 64 years respectively. The clinical, diagnostic and therapeutic aspects are discussed at length. The authors point out that amoeboma possesses no specific symptomatology and diagnosis rests on rapid clinical and radiological improvement after emetine treatment. Treatment is essentially medical, except in extreme cases. The differential diagnosis between amoeboma and malignant disease is discussed and the difficulties stressed. Four radiological pictures are shown. Clinical cure was obtained in each case.

H. J. O'D. Burke-Gaffney

MATHIS, C. Au sujet des médicaments dits " amoebicides ". [**"Amoebicidal" Drugs.**] *Bull. Acad. Nat. Méd.* 1949, v. 133, Nos. 29/30, 577–80.

New drugs now being advocated in the treatment of amoebiasis are said to have a greater amoebicidal activity than that exerted by emetine. In the author's opinion there is no drug at present in use which acts directly on the amoebae in the gut, and most French physicians do not consider emetine to be directly amoebicidal, but to exert its action on the smooth muscle of the intestinal capillaries.

The introduction by ROGERS in 1912 of emetine into the therapy of amoebic dysentery, though a great achievement, was unsoundly based on the experiments of VEDDER (1912), who demonstrated a lethal action of the ipecacuanha alkaloids on cultures of saprophytic amoebae. Nevertheless the remarkable curative action of emetine in amoebic dysentery seemed to support the conception of a specifically amoebicidal property of the drug, though cysts continued to be passed in the stools after emetine treatment. MAUREL suggested that emetine after a brief period of vaso-dilation causes vigorous constriction of the small intestinal vessels, which become impermeable and so deprive the amoebae of red cells.

There are two forms of "*Entamoeba dysenteriae*," the *tetragena* and the *histolytica* forms; the *tetragena* form is the commoner and lives commensally on the surface of the mucosa; but under certain conditions this assumes the *histolytica* form which is pathogenic and causes lesions of the gut wall, which it invades. In the absence of red cells *tetragena* forms cannot become *histolytica* forms, and the cysts which continue to be excreted after emetine treatment derive from the *tetragena* forms which survive the treatment.

It is a serious matter that in asserting the superiority of a new drug the abandonment of emetine is being advocated on the grounds that emetine is a dangerous drug; this statement is unjustifiable, as grave toxic manifestations are due not to the drug but to its misuse by certain physicians. Emetine if used improperly and given in excess may cause grave toxic manifestations.

Some drugs are amoebicidal *in vitro* and one of the most powerful of these is emetine; but none are known to be amoebicidal *in vivo* as the dosage necessary to produce the concentration found lethal to amoebae *in vitro* would be lethal to the patient. When the amoebic activity has been controlled by treatment

attention should be directed to the associated bacterial infection which causes the congestive haemorrhagic condition of the bowel wall. It is this latter which is responsible for the transformation of " *E. dysenteriae* var. *tetragena* " to the pathogenic *histolytica* form of the parasite.

In discussion, LOEPER agreed that the therapeutic action of emetine in amoebic dysentery was neither directly nor solely amoebicidal, though he thought some amoebicidal action was exerted by the drug when given in therapeutic dosage, the slow elimination of emetine in the bile and intestinal mucus increasing its concentration in the gut. The action of emetine is greater on the muscle fibres of the gut than on those of the vessels, and indeed in some experiments done 20 years ago emetine in the doses used caused vascular dilatation, though the contraction of the intestinal muscle fibres brought about obliteration of the vessels in the gut wall. *A. R. D. Adams*

BATTERSBY, A. R. & OPENSHAW, H. T. **Studies of the Structure of Emetine. Part IV. Elucidation of the Structure of Emetine.** *J. Chem. Soc.* 1949, Dec., 3207–13.

KNIGHT, A. A., TARUN, D. W. & MILLER, Jeanne. **Studies of the Influence of Oxyquinoline Drugs on Growth of** *Endamoeba histolytica* **as measured in Blood Iodine Levels of Man.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 871–80, 4 figs.

The levels of iodine in the blood of human patients after administration of therapeutic doses of the oxyquinolines, Anayodin, Chiniofon, Diodoquin and Vioform were previously determined by the authors, and with the use of the iodine values an attempt has now been made to determine the concentration of these substances in the blood which would inhibit *E. histolytica in vitro.* A liquid culture medium consisting of equal parts of human serum and egg infusion with rice starch was used. Counts of amoebae were made by the method of PAULSON [this *Bulletin,* 1933, v. 30, 388] after 48 hours' incubation at 37°C., and bactericidal activity was determined at the same time in the mixed flora accompanying *E. histolytica.* In a typical experiment cultures were made in the serum of a normal person, in that from a patient with amoebiasis before treatment, and also in that from the same patient, after seven days' treatment with drug, the iodine content of the serum being known. The procedure is described as a new method of studying *in vitro* the therapeutic effectiveness of the above iodine substituted drugs [the state of combination of the iodine is however not indicated]. It was found that the serum iodine level was inversely proportional to the growth of *E. histolytica* in the case of all the drugs used. The concentration of iodine required to cause death of amoebae at the time of examination was 250 to 300 γ per 100 ml. of medium. There was a high iodine concentration in faeces after administration of these substances. *J. D. Fulton*

HAWORTH, R. D., MCKENNA, J. & WHITFIELD, G. H. **The Constitution of Conessine. Part II.** *J. Chem. Soc.* 1949, Dec., 3127–31.

SOBERON Y PARRA, G. & PELÁEZ, D. La Nivaquina (Sontoquina) en el tratamiento de la giardiasis. [**Nivaquine (Sontochin) in the Treatment of Giardiasis.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, July–Aug., v. 5, Nos. 7/8, 110–13. [78 refs.]

After referring to many who have written on the pathogenicity or non-pathogenicity of *G. intestinalis,* the present authors give a list of the investigations carried out in different parts of Mexico, stating the numbers of examinations made and the percentage positive for the parasite. They then record

their results from the use of Nivaquine in 64 patients so infected. They gave the drug in pastilles of 0·1 gm., three daily to adults for five days, to children according to age. Thirty-seven of these patients were under observation for several months and only in five were the parasites seen to recur. One or two are specially referred to: A child of six years was given 0·1 gm. daily for the five days; for 11 weeks the stools were examined and were negative, but cysts then reappeared and continued to do so in spite of repeated treatment. Atebrin [mepacrine] was then given and they again disappeared, but for a short time only. Next, a child of 18 months was given 0·1 gm. daily for five days—a relatively large dose but quite well tolerated—and by the third day the stool no longer revealed the parasite and repeated examinations during the ensuing three months showed them still negative. *H. Harold Scott*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

MAROC: RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR, ANNÉE 1948. pp. 15–17. Spirochaetoses. [**Spirochaetoses.**]

Three species of spirochaetes, *S. hispanica*, *S. duttoni* and *S. merionesi*, were inoculated into the anterior chamber of the rabbit's eye. In each case they produced conjunctivitis with chemosis and interstitial keratitis. *S. hispanica* produced the most intense lesions, the keratitis resembling that produced by syphilis spirochaetes.

Leptospira icterohaemorrhagiae is present in about 11 per cent. of the local wild rats, but yet the disease is very rare in man. At Casablanca the organism has been isolated from two patients out of 13 showing jaundice, and guineapigs were infected from them. In addition one strain was carried through various animal passages including the black rat *Rattus rattus frugivorus*, and a Moroccan Squirrel, *Atlantoxerus getulus*. The latter was found to be quite as susceptible as the guineapig, and out of 22 animals infected, all succumbed, usually after five to six days. The symptoms resemble those found in the guineapig. This squirrel was also found to be very susceptible to a wide range of microbial infections. *E. Hindle*

COLAS-BELCOUR, J. & VERVENT, G. Transmissibilité et virulence d'une souche de *Spirochaeta* (=*Borrelia*) *hispanica*. [**The Transmission and Virulence of a Strain of** *Spirochaeta* (*Borrelia*) *hispanica*.] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 470–79, 1 graph. [13 refs.]

A strain of *S. hispanica* isolated from *Ornithodorus erraticus* was transmitted in series by subcutaneous inoculation from one guineapig to another over a period of two years, involving 75 passages. The virulence of the strain, as indicated by the mortality of the animals, showed considerable variation, there being a high virulence from the first to the 34th passage, then a marked diminution from passages 35 to 65, after which the virulence was re-established. On seven occasions (8th, 10th, 32nd, 40th, 46th, 70th and 71st passages) *Ornithodorus erraticus* were fed on the infected guineapigs and in each case the spirochaetes were found to have retained their property of being transmitted by these ticks. The secondary strains of spirochaetes resulting from these transmissions, with one doubtful exception, were all found to be similar in virulence, although the ticks from which they had been isolated had been infected by feeding on strains of different virulence. *E. Hindle*

COLAS-BELCOUR, J. & VERVENT, G. Essai de transmission de *Spirochaeta* (*Borrelia*) *hispanica* par l'*Ornithodorus delanoei* Roubaud et Colas-Belcour, 1931. [**An Attempt to transmit** *Spirochaeta* (*Borrelia*) *hispanica* **by** *Ornithodorus delanoei* **Roubaud and Colas-Belcour, 1931.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 447–8.

Ornithodorus delanoei was discovered in the burrow of a porcupine in Morocco, and is closely related to *O. erraticus*, a natural carrier of *Spirochaeta hispanica*. Two lots of nymphs of *O. delanoei* were fed on a guineapig infected with this spirochaete and subsequently on normal guineapigs. These remained uninfected as well as other animals inoculated with the ground-up contents of these ticks. *E. Hindle*

BOIRON, H. Transmission de *Spirochaeta duttoni* var. *crocidurae* par l'ornithodore et par le pou ; considérations sur l'épidémiologie de la fièvre récurrente à poux. [**The Transmission of** *Spirochaeta duttoni* **var.** *crocidurae* **by** *Ornithodorus* **and by the Louse ; Considerations on the Epidemiology of Louse-transmitted Relapsing Fever.**] *Ann. Inst. Pasteur.* 1949, Nov., v. 77, No. 5, 620–31. [32 refs.]

The author records two further experiments in which infection with *S. duttoni* var. *crocidurae* was produced in mice by the inoculation of the contents of lice that had fed on infected animals seven to 15 days previously. These results confirm previous observations on the subject [this *Bulletin*, 1949, v. 46, 1048]. The remainder of the report is contained in a previous publication by the author [*ibid.*, 1046]. *E. Hindle*

BOCK, Marianne. Über die Wirkung einiger Sulfonamide und Sulfone auf die experimentelle Spirilleninfektion der weissen Maus. [**The Action of Sulphonamide and Sulphone Compounds on Experimental Spirilla Infection in White Mice.**] *Ztschr. f. Hyg. u. Infektionskr.* 1948, Nov. 30, v. 128, Nos. 5/6, 654–61.

The author has tested the therapeutic action of various sulphonamide and sulphone compounds on infections of *Spirillum minus* in white mice. Two compounds, Debenal (sulpha pyrimidine), and especially Methyl-debenal (a 4-methyl derivative), were found to be the most efficacious and far more active than Neosalvarsan. The minimum curative dose of the latter was found to be 1/500 gm. per 20 gm. mouse, while for Debenal it was 1/750 gm., and for Methyl-debenal only 1/7,500 gm. Similar differences were found between the respective minimum doses to prevent relapses. These compounds were then tested on various spirochaetal infections, and found to have no experimental therapeutic action on syphilis in rabbits, and only a slight effect on *Spirochaeta duttoni* in white mice.

The author considers that these results support the view that spirochaetes and spirilla are not closely related, and that the latter belong to the group of bacteria, including vibrios and allied organisms, which are also susceptible to the action of sulphonamides. *E. Hindle*

LEPROSY

CHAUSSINAND, R. L'expansion de la lèpre de l'antiquité à nos jours. [**The Expansion of Leprosy from Antiquity to Today.**] *Acta Tropica.* Basle. 1949, v. 6, No. 2, 105–19. [48 refs.]

This is an erudite paper for the most part on the usual lines, but with some points of interest as regards the earliest history of the disease. Some of the

most ancient supposed references to leprosy in India are rejected and the first accurate description is considered to be that of 600 B.C. in the Sushruta Samhita, which includes the use of oils in the areas of widespread *Hydnocarpus wightiana* trees, which form at least one of the first seats of the disease. The biblical references to leprosy are discussed and the conclusion is arrived at that they do not afford indisputable evidence of the prevalence of leprosy at the times of Moses, but the cruel methods then used are held to be responsible for the horror of leprosy which still persists. Without accepting the most ancient of alleged Egyptian references it is held that the disease was known in the time of the Pharaohs. In China it is admitted that leprosy was known in the fifth century B.C. several centuries before Confucius, from when it was introduced into Japan about the seventh century A.D. The description of the spread of leprosy from Asia over Europe is in accordance with accepted opinion.

The causes of the decline in Europe are also in agreement with modern opinion in rejecting segregation and in attributing the decline to the arrest of imported leprosy after the end of the Crusades, the black death (plague) in 1347–50 and the gradual improvement in sanitation. The spread of leprosy over the world in latter times also reveals nothing new and the estimates of the prevalence of leprosy in different countries of the world are quoted with reservation that many of the data are only approximate.

The influence of the prevalence of tuberculosis on that of leprosy is also discussed and the conclusion arrived at that the decline of leprosy in Europe is in great part due to the expansion of tuberculosis.

The author finally concludes that the efforts of man in the past have done little or nothing to influence the incidence of leprosy. *" L'étude de l'histoire de la lèpre est une grande leçon d'humilité."* *L. Rogers*

BOENJAMIN, R. Epidemiologisch onderzoek naar de beteekenis van den duur en den aard van het contact met lepralijders. [**Epidemiological Investigation of the Duration and Nature of Contact with Leprosy Patients and their Significance.**] [Thesis for Doctorate in Medicine, Batavia, 1949.] pp. 1–99, 1 fig. [Summary conclusions and tables in English pp. 101–196.]

This is a valuable and detailed discussion of the conditions influencing infections with leprosy through intercourse in infected families, which should be studied by those interested : the work includes a long English summary. In the Batavian municipality, 500 unselected families with leprosy and 80 per cent. of 25,000 inhabitants were examined and the character of the contact that led to the development of leprosy and its duration analysed ; full details are given, including the types of the cases.

Under this heading the important conclusions are come to that transmission by family contact with a case of nerve-leprosy is not proved and that new cases in such families are due to intercourse of the inmates with infected persons " outside " their own family circle. Furthermore, new cases in families of patients with skin leprosy may in principle be ascribed to intercourse of inmates with leprous members of the family, but the influence of intercourse of inmates with infected persons outside the family-circle is of secondary significance in these families.

Factors which influence the transmission of leprosy " within " the lepers' family circle are next dealt with, including bed-contact or its absence and duration of contact. It was found that with bed-contact at the age of 0–14 years the average morbidity was $46{\cdot}3 \pm 6{\cdot}09$ per cent. and with older inmates the figure was but $6{\cdot}0 \pm 3{\cdot}36$. On the other hand, family intercourse without bed-contact revealed no significant difference in the infection among the younger and the older age groups. Furthermore, nothing pointed to any

difference between the chances of disease in either sex. Data of the duration of bed-contact showed a sharp rise in the second year of contact from 1·5 per cent. to 17 per cent., after which it gradually fell. The average duration of contact, inclusive of the incubation time, amounts after bed-contact to $3{\cdot}6 \pm 0{\cdot}3$ years, and after family-contact, without bed-contact to $7{\cdot}2 \pm 0{\cdot}5$ years, so that the short duration of contact and incubation after bed-contact is a typical phenomenon. This is a very important conclusion. It is also pointed out that infection through bed-contact at an early age is so easily effected when the contact starts at the age of 0–14 as to surpass by far that of all other forms of intercourse between leprous and non-leprous inmates of infected houses.

The origin of infection with an unselected group of persons affected with leprosy is next studied and the conclusion is reached that at most a fourth part of the leprous population in the municipality of Batavia are infected by leprous inmates; with the rest of them the infection is for the greater part due to "house" contact with leprous neighbours and other infected persons. Compared to the contact within the family environment, the average intensity of the contact outside the family circle is smaller, whereas the number of contact persons is larger. More men than women are moving in those circles outside the family. [It is of interest to note that the great danger of house infection of children from the infective cases of skin-leprosy in the house and the danger of bed-infections of children was arrived at from a study of fifty years' literature on leprosy twenty-five years ago and recorded in the opening epidemiological sections of "*Leprosy*".] *L. Rogers*

GROVE-WHITE, R. J. **Some Aspects of Leprosy.** *Proc. Alumni Assoc. King Edward VII College of Med.* Singapore. 1949, June, v. 2, No. 2, 172–83.

LEPROSY IN INDIA. 1948, Oct., v. 20, No. 4, 190–205. **Report of the Activities Directly under the Indian Council of B.E.L.R.A., 1947.**

This article deals with work of Calcutta Leprosy Research Department under Dr. Dharmendra and his assistants, much of which has been published already in papers by these workers, references to which are given at the end of the article and reviewed in this *Bulletin*. The following further points are of interest, in addition to recorded work on the sulphone treatment, etc.

R. Row's claim to have cultivated the leprosy bacillus in symbiosis with leishmania cultures has been investigated with negative results. Occasional bunches of bacilli were met with in the primary culture tubes and were always associated with tissue matter: they were not constantly found on repeated examinations. All sub-cultures were entirely negative. Eye lesions in over 200 cases have been investigated with the collaboration of Major Somerset, Professor of Ophthalmology, Calcutta, with the aid of a slit microscope. It was concluded that serious eye lesions are much less frequent in India than in some other countries infected with leprosy such as Havana and Honolulu. In Calcutta, neural lesions are secondary to nerve involvement affecting the eye muscles and the cornea. In the lepromatous type, both superficial and deep infiltration occurs in the form of episcleritis, punctate and deep keratitis and iritis. Histologically, tuberculoid cases with reactions were met with together with lesions of doubtful classification, but which were strongly positive bacteriologically, as in lepromatous lesions, and of a progressive nature with negative lepromin tests. On the other hand, the tuberculoid cases tended to subside and to give positive lepromin reactions as a rule.

MOISER's suggestion that cockroaches are responsible for the transmission of Leprosy has also been investigated in Calcutta. Acid-fast bacilli were found in these insects collected in Calcutta, and also in a part of Delhi, where very little

leprosy occurs, in small numbers in 45 to 67 per cent. and in every field of the preparation in 3 to 7 per cent., but a higher percentage occurred in Delhi than in roaches from a leprosy hospital in Calcutta, so there is no relation between the presence of bacilli and the occurrence of leprosy. Moreover those found in these insects were shorter and thicker than those of leprosy and could easily be cultivated. The author was therefore unable to confirm Moiser's claim, although the acid fast bacilli from the insect gave antigens reacting intradermally like those due to a true lepra bacilli. *L. Rogers*

MICHAELIDES, N. C. **Leprosy in Cyprus.** *Cyprus Med. J.* 1949, Feb., v. 2, No. 4, 65–73, 4 figs. [In Greek 75–89.]

Leprosy patients in Cyprus number 212 of whom 93 are inmates of a farm or colony and the rest are treated at their homes as they are neural cases which are not so infectious as the lepromatous, and in a number of them the disease has been cured and they are under careful supervision. The disease is familial and all had infected relatives from whom they contracted the disease. Each inmate of the farm has a separate room. The sulphone treatment has been in use since January 1948 with the following results in the case of 53 nodular or mixed cases (nerve cases are not so treated). In 34 cases no clinical signs remain and 14 of them are also negative bacteriologically. In seven there is clinical improvement with absence of bacteria, in 12 slight improvement but bacteria remain. Thus in 65 per cent. the clinical signs have disappeared and in 48 per cent. the bacilli are absent. The cases were early in 17, moderate with nodular lesions in 26 and advanced in ten. The patients are optimistic. It is also recorded that the disappearance of anaesthesia and the cure of claw-hand indicate that in mixed cases the sulphone treatment has some action on neural leprosy. *L. Rogers*

GUYANE FRANÇAISE & ININI. RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR PENDANT L'ANNÉE 1947. Publication No. 173. pp. 35–52 ; 63–73. [16 refs.] Lèpre. [**Leprosy.**]

This report gives a full description of leprosy work in French Guiana, but contains little new. The first section deals with the work of the pathological laboratory. The known number of cases of leprosy in the colony is 1,210, about one-fourth of which are isolated at least temporarily. Examinations of school children have revealed a number of clear and doubtful cases. Among 111 new cases, only 13 were lepromatous, 57 per cent. were under 15 years of age and 56 of the 111 were detected within one year of the first symptoms. The leprosarium has been enlarged and modernized, and an agricultural colony provided for 300 of recoverable patients. Histological examinations confirm the findings of FITE and GEMAR (*Internat. J. Leprosy*, 1947, v. 15, 431). An account is given of the sulphone treatment of a small number of patients for not more than one year with promising results in not too advanced cases.

L. Rogers

INNES, J. R. **Leprosy in Tanganyika ; a Survey of the Lake Province.** *East African Med. J.* 1949, July, v. 26, No. 7, 199–201.

This is a report on an important survey of a little studied leprosy area. Among a population of 1,600,000 people samples of 1,000 or more, totalling 61,607 people, were examined and 979 cases found, or 15·8 per cent., which indicates an estimated grand total for the province of 25,000. A table of the percentages in different groups varied between 0·7 and 60·9 per cent. of those examined.

Males slightly exceeded females. In an island survey, of all the inhabitants 22 per cent. occurred in children up to 14 years of age ; this is a low figure and only about one-fifth were of the lepromatous type : both of these features are indicative of a mild type of the disease in general as compared with some other African tropical countries. The living conditions in small dark huts, often with multiple wives, resulted in a total of 691 cases of leprosy living in home contact with a total of 1,663 children, while only 81 lived alone. Segregation was not practised except in Irugwa Island which had the low rate of 5·1 per cent. Other conditions favouring high leprosy rates included high humidity and proximity to the high leprous area of Eastern Congo in which area 60·9 per cent. were found. *L. Rogers*

INNES, J. R. **Leprosy in Tanganyika. Results of Sample Surveys in a Wide Range of Places.** *East African Med. J.* 1949, July, v. 26, No. 7, 202–3.

This paper deals with leprosy surveys in many parts of the Territory with samples of people varying in numbers from 92 to 980. The total number of persons examined was 8,572 with 123 cases of the disease, or 14·3 per mille, and varying between none and 5·3 to 35·7 per mille. As these figures cover a wide range of locality they assist in building up the picture of the leprosy situation in Tanganyika. The range of ages of the sufferers is also given in the full table, from which it appears that they are very largely made up of youths, so that the incidence would be much higher for the whole population represented. A second table shows the totals recorded in this paper and that of the Lake Province as 1,102 leprosy cases among 70,179 population examined, or 15·6 per mille. *L. Rogers*

INNES, J. R. **Leprosy in Tanganyika. A Survey in the Southern Highlands Province.** *East African Med. J.* 1949, Aug., v. 26, No. 8, 212–15.

In this further survey, 529 cases of leprosy were found among 43,846 persons examined, or 12·0 per mille. As the approximate population of the Southern Highlands Province of Tanganyika is 861,000 this indicates an estimated total number of cases at 10,330. The rates in the different areas varied from 2·5 to 31·0 per mille. The percentage of cases in children up to 14 was 18·8, and from figures given the percentage in those up to the age of 20 appears to be 33. Lepromatous cases formed only 19·8 per cent. of the total as is usual in East Africa, and no less than 66·7 per cent. were of the very slightly infectious and easily curable tuberculoid type with a high degree of resistance : this is an indication that leprosy is of a moderate degree in Tanganyika as a whole. Only 4·7 per cent. of the patients lived alone, but 81 per cent. lived in contact with children. Moreover 81 per cent. lived in a humid climate and only 19 per cent. in a dry. High altitudes with low temperatures did not influence the number or type of the cases, but scattered populations tended to show a low incidence. On the contrary, overcrowding in a humid atmosphere favoured high incidence as did failure to separate children from house contact with infected cases. The Rungwe district has the highest incidence of 20·5 per thousand, but has a leprosarium for 600 cases, soon to be raised to 1,000, and provided with a fuller staff : efforts should be made to encourage home segregation of known cases together with separation of children from home contact with the diseased. The total surveys carried out in Tanganyika between 1947 and 1949 show an incidence of 14·3 per mille among 114,025 people examined. This indicates a grand total of 80,000 leprosy patients now in Tanganyika Territory, against an estimate of 12,000 by COCHRANE and MUIR in 1938 shown in the table in the third edition of *Leprosy*.

Dr. Innes' surveys furnish the necessary information to enable the extended use of modern methods of prophylaxis and treatment with good prospects of gradually reducing the incidence of leprosy in Tanganyika. *L. Rogers*

DHARMENDRA. **Diet and Susceptibility to Leprosy.** *Leprosy in India.* 1949, Oct., v. 21, No. 4, 180–92. [Numerous refs.]

This is a general discussion of the subject presented to the Calcutta Conference of 1949. After dealing with the effect of diet and infection in general, the author quotes from various other workers, most of whom favour such a relationship, although Cochrane opposes this view, and he proceeds to consider the diet in countries poor in protein, vitamins, calcium, etc. He finds that no conclusions can be drawn regarding malnutrition as a predisposing cause since both those infected with leprosy, and those free from the disease are equally affected in any given place. He points out that in Eastern India the disease is much more prevalent among the rice-eating peoples of Bengal and Madras than in wheat and milk areas of the North-West. [These are also the areas of high rainfall and humidity favouring leprosy prevalence.] Floods and famine are also known to increase the incidence as did famine conditions in West Bengal in 1943. The various papers referred to have been dealt with in this *Bulletin*, so only the conclusion need be mentioned that there is no experimental proof that malnutrition predisposes to leprosy, but there is considerable general evidence to that effect. *L. Rogers*

TISSEUIL, J. Tension superficielle et orientation des bacilles de Hansen et de Stéfansky. [**Superficial Tension and Orientation of Hansen's and Stefansky's Bacilli.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 5/6, 144–5.

The bacilli of Hansen and of Stefansky are both intracellular and but little pathogenic for any but man and rats respectively. That of Hansen occurs in cigar-like packets, that of Stefansky in needle-like bundles, but it is not possible to distinguish them from each other. One appears to be embedded in gelatinous material, the other is free, Hansen's organism is in a homogeneous medium, Stefansky's in a heterogeneous one. The organisms of human leprosy seem to be submitted to a superficial tension which enables them to retain their grouping in tissue sections and in nasal mucous except in young forms and their parallel distribution is dependant on the superficial tension. On the other hand those of Stefansky are free and able to group themselves by chance. *L. Rogers*

DHARMENDRA & MUKERJEE. **Effect of Sunlight on the Staining Properties of the Leprosy Bacillus.** *Leprosy Review.* 1949, Oct., v. 20, No. 4, 111–14.

In this test, smears of leprous tissue rich in bacilli were exposed to sunlight for different periods and then stained by the Ziehl-Neelsen method. Up to six hours' exposure they showed no difference, but with longer periods fewer bacilli stained red until at the end of 18 hours there were hardly any acid-fast bacteria left. Protection of the films with pieces of black paper prevented this change, which was therefore not due to the heat of the sun. Further tests showed that the ultra-violet rays produced the change but not the infra-red ones. Moreover the sun's rays had no such effect on rat leprosy bacilli : this furnishes another difference between the two organisms. *L. Rogers*

NOEL, R. & Soeur MARIE-SUZANNE. **The Role of the Capillary Perithelium in the Formation of the Cutaneous Leproma.** *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 61–4, 2 figs. on 1 pl.

The authors agree with the view that the reactionary cells in cutaneous leproma are histiocytes and they have made sections of an early lesion from

within three days of its appearance, to trace the developmental changes. At the earliest period, when there was no inflammatory infiltration of the dermis, the lesion showed the normal fibrillary structure, the adventitia was composed of histiocytes and the capillaries and endothelial cells were evident. One or more lepra bacilli could be seen in endothelial or perithelial cells. The perithelial reaction was the only perceptible one. Six months later the same lesion showed disappearance of the epithelial papillae and the dermis was coarsely fibrous with voluminous bundles interwoven in all directions and a mass of histiocytes and lymphocytes were scattered in the fibrillary matting. Bacilli were more numerous in bunches within the histiocytes. A month later, during a reaction, the inflammatory infiltration involved the entire dermis, which contained histiocytes full of lepra bacilli; some of these cells showed vacuoles. Thus in the first stages of the evolution of a lesion the essential characteristic is the elective hyperplasia of cells of the reticuloendothelium system which surround the capillaries. The lymphocytic reaction comes later and is always secondary.

L. Rogers

HANKS, J. H. & WALLACE, R. E. **Sterilization of Skin.** *Proc. Soc. Exper. Biol. & Med.* 1949, June, v. 71, No. 2, 200–201, 1 fig. [Summary appears also in *Bulletin of Hygiene.*]

A technical problem in leprosy research is how to obtain uncontaminated viable tissue cultures. The authors used various skin disinfectants immediately before biopsy of rat skin. They observed the tissue cultures of the uppermost or papillary layer at intervals up to 14 days, and expressed the results in terms of (1) the proportion of explants free of bacterial contamination; and (2) the proportion positive for epithelial cells.

In a controlled trial, the antiseptics were applied for two minutes. With 3·5 per cent. iodine (tincture 1 : 2 in 70 per cent. alcohol by weight) 40 per cent. of cultures showed no epithelial migration. With 0·1 per cent. Zephiran or 2 per cent. aqueous mercurochrome at least 17 per cent. showed bacterial contamination and at least 33 per cent. showed final failure of epithelial migration (partly due to contamination).

In contrast to the effect on the upper layer of epithelial cells, the disinfectants had no inhibitory action on the tissue culture of fibroblasts nor of epithelial cells from the deeper or reticular layers of the skin.

The authors, without presenting data, express satisfaction with 1 : 4 tincture of iodine applied for five minutes, followed by its removal with alcohol.

Elizabeth Topley

DHARMENDRA & SEN, N. **Frequency of the Presence of Leprosy Bacilli in Nasal Smears of Leprosy Patients.** *Leprosy in India.* 1948, Oct., v. 20, No. 4, 180–84.

This paper records important data derived from examination of 4,072 cases of leprosy in Calcutta classified thus :—

Type	Skin Smears	Total Cases	Nose Negative	Nose Positive	
				Number	Per cent.
N	Negative	2,834	2,829	5	0·17
N	Positive	447	289	158	35·4
N ? L	Positive	121	34	87	72·0
L	Positive	670	51	619	92·4

[N ? L indicates cases which could not be certainly classified clinically.]

These data speak for themselves. The five neural cases with negative skin but positive nasal smears bacteriologically, include two tuberculoid ones, one of which was reacting, when lepra bacilli are more frequently found. Detailed notes of these five cases are tabulated. One of the positive tuberculoid cases showed a nasal granuloma, sections of which contained numerous lepra bacilli during reaction; the number decreased within a year. The author states that it is well known that the bacilli persist longer in the nose than in the skin and that the nasal cases may become positive during reactions. He concludes that a very large proportion of cases with negative neural skin lesions are also negative nasally, but the nose should also be examined to detect the presence of lepra bacilli in cases with negative neural lesions. On the other hand neural cases with positive skin lesions also show lepra bacilli in the nasal mucous membrane in one-third of the cases. The further fact is stated that the doubtful types N ? L showed the high percentage of 72 per cent. positive nasally. This indicates that most of them were early lepromatous cases. The figure of 91·4 per cent. of lepromatous cases positive to both skin and nasal examinations is in accordance with general experience. *L. Rogers*

CONTRERAS, F., GUILLÉN, J. & TORRELLA, E. Antigeno esplenico para la reacción alergica en lepra. Nota previa. [**Splenic Antigen for Allergic Reactions in Leprosy.**] *Rev. "Fontilles"*, Valencia. 1949, July, v. 2, No. 4, 312–14.

It would be useful to find an antigen, reaction to which would differentiate tuberculoid leprosy from certain forms of lupus and sarcoid.

At an autopsy on a leprosy patient the authors found the spleen enlarged, violet-coloured, friable and containing such vast numbers of lepra bacilli that it "gave the impression of being a pure culture." [The mere colour and size of the spleen had not always this significance; in another instance the organisms were very scarce.] With this tissue they prepared a lepromin by the Mitsuda-Hayashi technique. They boiled portions of the spleen for 30–60 minutes and added 20 cc. physiological saline to each gramme. They then filtered it through gauze, kept it at 60°C. for an hour and finally added phenol to 0·5 per cent. Tested on leprous patients the results were "normal," that is, negative with the lepromatous, positive with the tuberculoid. The intradermal reaction might occur as early as 6 hours, with an erythema as large as a 5-peseta piece, and begin to retrogress in 14 hours, leaving a papule like that obtained with the ordinary Mitsuda antigen lasting for 7 days and even longer, up to 21 days. The use of a more concentrated antigen, double strength, produced the same result. *H. Harold Scott*

RYRIE, G. A. **Elicitation and Interpretation of Tactile Anaesthesia.** *Leprosy Review.* 1949, Oct., v. 20, No. 4, 114–18.

This short note records the author's experience, which differs in some respects from the usual views. Thus, he holds that special skill is required to elicit variations of sensation in leprous subjects and he gives short notes of three cases in which errors occurred. He regards the use of stiff paper, pins or needles as wrong methods of testing for anaesthesia and advises reliance only on the use of a very fine point of cotton wool for finding tactile anaesthesia in early cases. As the hair of the skin may be sensitive when the skin is not so, the suspected and control areas should be shaved before testing. Trauma round the ankles is a common cause of anaesthesia and so may be misleading. Tests in 10 normal Africans showed all the body to be sensitive except where

the skin was stretched or thickened especially over joints. A diagnosis of leprosy should therefore not be made when there is no skin lesion, thickened nerve or muscle wasting. *L. Rogers*

PARDO CASTELLÓ, V. & PIÑEYRO, R. **Lazarine Leprosy : its Position in the Present Classification of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 65–72, 2 figs. on 1 pl. [13 refs.]

INTERNAT. J. LEPROSY. New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 95–102. [27 refs.] **The "Lucio" and "Lazarine" Forms of Leprosy.** [Editorial.]

The authors first review the literature and then report their own observations and discuss the present position of the subject. Some of the writers on this subject have described very different conditions as being lazarine leprosy, but the present authors experience was with cases in Cuba, where the bullae are rarely multiple and usually arise on an erythematous patch, but spread and break down with destruction of the deeper tissues even to the bones. The histological structure is that of tuberculoid leprosy with a necrotic core ; the lepromin test is always positive and the tendency is to spontaneous recovery. In recent cases numerous acid-fast bacilli were found in the necrotic material, but disappeared when that was eliminated. The tuberculoid structure was vascular with numerous polynuclears and the lepromin test was positive. Bullous lesions may be the predominating feature in a number of cases of leprosy and occur in lepromatous cases, as in Mexico, or in tuberculoid ones as reported in Cuba and the Philippines. The authors therefore consider that there is no reason to create a " lazarine " type of leprosy, but bullous or lazarine phenomena should be reported as a clinical condition occurring in either form.

An editorial discusses the whole subject and its literature. *L. Rogers*

GOUGEROT, H. Lèpres invisibles. [**Invisible Leprosy Lesions.**] *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 13–17. [Refs. in footnotes.]

The author discusses how to recognize cutaneous and mucous membrane invisible lesions of leprosy. They may reveal themselves by the subjective symptoms of irritation, neuralgias or diminution of sensation, or alteration in pigmentation. The intravenous injection of methylene blue produces coloration of previously invisible dermal lesions as well as others and biopsies can then be made to study the microscopical changes, type of the lesions and the presence or absence of lepra bacilli. The lesions thus demonstrated may be anaesthetic macules of 10 to 30 millimetres in extent in which Hansen's bacilli may be found. Areas revealed by methylene blue are usually rich in bacilli and show the characters of lepromatous lesions. Cases illustrating these methods are given and finding them furnishes guidance in treatment.

L. Rogers

MURDOCK, J. R. **Thickening of Superficial Nerves as a Diagnostic Sign in Leprosy.** *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 1–12, 12 figs. on 3 pls. [26 refs.]

The author reports a more intensive study of the diagnostic value of thickened superficial nerves than that derived from the common examination of the four or so most frequently involved, which he made in unselected recent cases in

the Hawaii observation hospital where he found one patient with thirty different nerves enlarged. Good photographs of 12 varieties are given, the best positions in which to observe each are described and a table of the percentage of positive cases includes for comparison the data of S. N. CHATTERJI in Calcutta [this *Bulletin*, 1934, v. 31, 549]. Sex or side of the body did not affect the incidence. The great auricular and the ulnar showed the highest rate of 70 per cent., followed by the superficial peroneal in 45 per cent. and the transverse cervical in 22 per cent. The thickening may be general, cigar-shaped or lenticular or node-like with tendency to abscess formation in the last. Acute enlargement with great pain is due to neuritis followed by rapid atrophy of muscles. Illustrative cases are recorded. In children, thickened superficial nerves may be the first sign and may enable incipient leprosy to be diagnosed, so it is, with the presence of accompanying anaesthetic areas, one of the most important differential signs. The author therefore advises that all children of leprous parents in close contact with leprous patients should be carefully examined for this sign every six months. *L. Rogers*

SIMONS, R. D. G. P. Über die sog. Prodrome der Lepra. [**The So-Called Prodromata of Leprosy.**] Reprinted from *Dermatologica*. 1949, v. 99, Nos. 2/3, 164–72. [13 refs.]

The English summary appended to the paper is as follows :—

" A critical survey of the literature shows that, although most publications speak of the prodromes of lepra, the actual reports of its occurrence are only based on anamnestic data, the value of which appears, for many reasons, to be extremely doubtful. To get a more certain judgment of this, the result of anamnestic interrogations in lepra patients and in 200 lepra-free persons were compared, and it was found that the so called prodromal symptoms were seen with almost the same frequency in lepra-free persons as in lepra-patients, and were the more frequent the more insistently one inquired about them. Furthermore, fever is frequent in the tropics due e.g. to malaria or filariasis. There are, therefore, no real proofs of the existence of prodromes in lepra. Statistically their existence is even improbable. This agrees well with the low toxicity of the lepra bacillus, which only produces very weak or no toxic symptoms in the body in spite of enormous quantities of them."

ROMERO, A., IBARRA, A. B. & FALLAS, M. **Clinical Study of Lepromatous Leprosy in Costa Rica.** *Internat. J. Leprosy*. New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 27–33.

Of 177 cases of leprosy seen in Costa Rica between 1945 and 1947 125 were lepromatous ones, which alone are dealt with in this paper. They include 14 with nodules or tubercles, 49 with infiltrated macules or plaques, 56 diffuse lepromas and 6 incipient cases. The nodular lepromatous cases are so few that lepromin could not be prepared. The cases appear to start in the nasal mucosa judging from the presence of lepra bacilli there in incipient cases. The numerous diffuse forms begin with loss of hair from the eyebrows, etc., general debility is evident, rhinitis with repeated slight epistaxis becomes pronounced, telangiectases are frequent and large livers and spleens indicate blocking of the reticulo-endothelial tissues. Reactions occur as rose-coloured spots and ulcers develop. The histology is also described on the usual lines. The authors regard the diffuse form as due to a massive invasion of Hansen's bacillus blocking the reticulo-endothelial system. Promin and diasone were beneficial in treatment. *L. Rogers*

SMITH, M. **A Pharmacological Study of Three Sulphones.** *Leprosy Review.* 1949. Oct., v. 20. No. 4, 128–34.

This paper records biochemical observations on the blood and urine during the administration of diaminodiphenylsulphone and the sulphones diasone and sulphetrone. The author observes that there is no reliable information that high blood levels of any of the sulphones promotes greater rapidity of clinical response in leprosy. He shows in a table the chemical method of computing the molecular ratio of the sulphones, which indicates that a blood level of the first preparation (called DADPS for short) of 1 mgm. per cent. could be maintained by a daily oral dose of 0·2 to 0·3 gm. and in a second table he shows that a daily oral dose of DADPS of 0·3 gm. gives a liberated molecular ratio of 0·26 gm. DADPS against 0·36 gm. from a dose of 1·5 gm. diasone and 0·21 gm. from 5·0 gm. of sulphetrone. A method of estimating from the urine and the blood the degree of in vivo hydrolysis of diasone and of sulphetrone is detailed and it was found that DADPS can be extracted from the urine of patients on the proprietary sulphones, which affords strong evidence of its presence also in the blood, which is difficult to estimate. Small doses of DADPS do not produce anaemia, but promise to be efficient. *L. Rogers*

BARTH, F. A., BLUMENMANN, B., PEREGO, C. & ROZEPPA, H. W. **The Production of 4,4'-Diamino-Diphenylsulfone and Derivatives on a Large Scale for the Anti-leprotic Campaign in the State of São Paulo, Brazil.** *Mem. Inst. Butantan.* 1948, v. 21, 111–15. [18 refs.] [Portuguese version 107–9.]

This is an important paper on the preparation of sulphones cheaply on a large scale, but is mainly of a highly technical chemical nature. Five methods of preparing 4,4'-diamino-diphenylsulphone are described, but the fifth was of most practical value and is as follows.

"The amination of 4,4'-dichloro-diphenylsulfone (13) satisfied all conditions mentioned above, giving 4,4'-diamino-diphenylsulfone in a 70 per cent. yield. Various methods have been tried in order to obtain 4,4'-dichloro-diphenylsulfone, such as sulfonation of chlorobenzene with sulfur trioxyde (14) or fuming sulfuric acid, condensation of 4-chlorobenzenesulfonic acid with chlorobenzene (15), the action of sulfuryl chloride upon chlorobenzene in the presence of aluminum chloride (16), the condensation of 4-chlorobenzenesulfonyl chloride with chlorobenzene using ferric chloride (17) or aluminum chloride (18) as condensing agent. This latter method with aluminum chloride proved to be the best, on the practical as well as on the economical side, being especially suitable to our home industry."

The advantages of this method are (1) simplicity of installation and equipment, (2) reduction in the number of intermediate reactions, (3) absence of by-products and isomers, (4) no necessity for importing raw material, (5) high purity of intermediate and final products and (6) very low production costs. With present equipment the authors can produce 35 kilogrammes monthly and by the end of 1949 they expected to produce enough for the treatment of all the 8,000 cases of leprosy in São Paulo State, which was their aim. *L. Rogers*

CONTRERAS, F. Las sulfonas en el tratamiento de la lepra. **Sulphone Compounds in the Treatment of Leprosy.** *Rev. Fronteiras.* Valencia. 1949, July, v. 2, No. 4, 289–304, 7 figs. on 3 pls.

This is a review of the subject in general terms and made up almost entirely of lists of names and opinions, but without references. After giving the graphic formulae of promin or promazide, promazole, diasone and sulphetrone,

the author speaks of each in turn under the headings of discovery and preparations employed, the sort of cases for which they have been found most suitable, the dosage and mode of administration, but all in general terms ; no figures are adduced. A few lines are added on others which are being, or are to be, tried, namely promacetin (sodium-4.4′diaminodiphenyl sulphone-2-acetylsulphonamide) ; analogous propyl and monoallyl derivatives, and acetylpromizole.

The chief interest of this paper [in the abstracter's view at least] is in the excellently reproduced photographs showing how closely certain non-leprous dermatoses may resemble those of leprosy itself ; those depicted are an elephantoid condition of the foot associated with chronic eczema, facial lymphadenia [hypertrophy of lymphatic tissue], leukaemia cutis and annular erythema.

H. Harold Scott

CONTRERAS, F., GUILLÉN, J. & TORRELLA, E. Nuestra experiencia sobre el tratamiento de la lepra con sulphetrone. [**Experiences in the Treatment of Leprosy with Sulphetrone.**] *Rev. "Fontilles"*. Valencia. 1949, July, v. 2, No. 4, 305–11.

Brief notes are given of 14 cases of leprosy, one tuberculoid and the rest lepromatous, treated with sulphetrone in daily doses from 1·3 to 2·7 gm. and totals up to 639 gm. ; two are still under treatment and have taken 550 and 400 gm. respectively. The tuberculoid case is hardly worth inclusion because the patient had been bacillus-free for many years and he was given sulphetrone only because the stock of alepol, which he had had, failed ; " his general state improved and the neuralgias disappeared completely." In general, it was noticed that improvement was most encouraging and might be even better if larger doses were given ; the cyanotic tint which mucous membranes may show is not accompanied by any change in the red cell count and is probably due to methaemoglobinaemia. The doses required to bring about amelioration are less than those of promin or diasone. In one man, 44 years of age, who had been given promin but whose treatment had been stopped because his eye-symptoms were progressing and the patient ascribed this to the drug, when given sulphetrone showed rapid improvement in the eye-lesions and his vision actually improved also. In two cases there were signs of intolerance—they had already shown intolerance, one to diasone, the other to promin—but no instance of true leprous reaction was seen.

H. Harold Scott

DE SOUZA LIMA, L. & DE SOUZA, P. R. **Pseudoexacerbation of Leprosy due to the Diamino-Diphenyl-Sulfones.** *Internat. J. Leprosy*. New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 19–21.

The authors point out that, in addition to some exacerbation of the symptoms of 12 per cent. to 15 per cent. of patients during the initial stage of sulphone treatment, they have observed a significant change which they call a pseudo-exacerbation during the first few months of treatment, usually after the administration of 200 to 300 cc. of promin solution or 100 to 120 capsules of diasone, rarely later. It consists of an acute outbreak of well-defined, infiltrated, erythematous patches surrounded by nodular or papular lesions, accompanied by oedema of the hands and feet, but with very little effect on the general condition of the patient and so resembling a reacting tuberculoid eruption. The exacerbations appear in any of the three types, but especially in lepromatous cases. Biopsy reveals the predominance of epithelioid cells arranged in nodular fashion. Not infrequently they found the coexistence of tuberculoid and lepromatous processes in the same section. The apparent

aggravation actually signifies considerable progress as the malignant unresisting form is changed into a tissue response characteristic of the benign forms. Their records include 68 such pseudoexacerbations, which they regard as an indication for increased rather than reduced dosage of the sulphones. In 17 of the 68 lepromatous cases the new lesions completely displaced the original form. The change of the type of the lesions, however, is not accompanied by the reversion of the Mitsuda reaction, which remains as it was before the exacerbation. The authors also suggest that the change of type indicates that the sulphones have a certain capacity of stimulating the reticulo-endothelial system. *L. Rogers*

DOSTROVSKY, A. & TICHO, A. **A Case of Ocular Leprosy treated with Autoserum from Cantharides Blisters.** *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 43–7.

In view of the difficulties in treating ocular leprosy an attempt was made to provide a sort of passive immunization by antibodies which the author assumed to be present in serum obtained from blisters induced by cantharides from recovering skin areas where lepromata had been present. A history of the case concerned showed long continued and variable eye symptoms which had recently progressed. The serum obtained in this way was applied by " direct instillation into the eye " and not by subconjunctival application. A clear-cut interpretation of the good result obtained was not found to be easy, as spontaneous recovery or the effects of gold therapy also used had to be considered ; but the latter had already been applied to the other eye without effect, yet a surprising improvement was observed three days after instillation of the autoserum. This improvement continued steadily and resulted in complete cure after gold therapy had been discontinued, so the authors think the serum played a decisive rôle in the curative process. *L. Rogers*

HERRERA, G. **Vitamin D in Massive Doses as an Adjuvant to the Sulfones in the Treatment of Tuberculoid Leprosy.** *Internat. J. Leprosy.* New Orleans. 1949, Jan.–June, v. 17, Nos. 1/2, 35–42.

The use of vitamin D in tuberculosis suggests its trial in addition to sulphones in large doses in leprosy. In tuberculoid cases occasional benefit appeared to result for a time in some cases so further trials were made ; children were chosen, to avoid the danger of arteriosclerosis. Large single doses of 500,000 I.U. were administered subcutaneously every four days with total amounts of 9 to 12 million I.U. within from 90 to 120 days. Detailed notes of eight cases are recorded and the results are summarized : one was completely cleared of lesions and two partly so out of three reactionary cases and four completely and one partly cleared of five non-reactionary ones. *L. Rogers*

HOHENNER, K. Ein Behandlungsversuch der Lepra mit dem Thiosemicarbazon TB I/698. [**The Treatment of Leprosy with Thiosemicarbazone TB I/698.**] *Med. Klin.* 1949, Oct. 28, v. 44, No. 43, 1378–81, 1 chart.

The following is a translation of the author's summary.

Thiosemicarbazone TB I/698 was studied as a means of treating leprosy. A man of 20 who was known to have had lepromatous leprosy for a number of years, was treated with TB I/698 for over six months, when the disease was found to be stationary. The appearance of increased inflammatory manifestations in the anterior chamber of the eye and the ciliary body with each new exhibition of the tablets was interpreted as being the effect of toxic products of bacterial disintegration.

Lepromata of the skin resolved rapidly under TB I/698. A fresh development of lepromata was nevertheless not prevented. Study of the humoral blood elements suggested that TB I/698 influenced the course of the disease and indicated some similarity with its effect on the course of human tuberculosis. *H. J. O'D. Burke-Gaffney*

DE SOUZA-ARAUJO, H. C. Estudo bacteriológico de escarros de leprosos-tuberculosos em tratamento com a Estreptomicina. [**Bacteriological Examination of the Sputum in Cases of Leprosy with Tuberculosis undergoing Streptomycin Therapy.**] *Mem. Inst. Oswaldo Cruz.* 1948, v. 46, No. 4, 669–71. English summary.

HELMINTHIASIS

PAUTRIZEL, R., BEZIAN, A. & BAILANGER, J. Etudes sur la toxicité des helminthes. I. Leur teneur en histamine. [**Studies on the Toxicity of Helminths. I. Their Histamine Content.**] *Ann. Parasit. Humaine et Comparée.* 1949, v. 24, Nos. 5/6, 460–63. [13 refs.]

The following is a translation of the authors' summary :—

After suitable chemical extraction and biological estimations, we have made systematic determinations of the histamine content of some helminths. The amounts determined are too low to be regarded as being directly responsible for the toxic manifestations seen in carriers of these parasites. [See also this *Bulletin*, 1949, v. 46, 850, 851.] *H. J. O'D. Burke-Gaffney*

ALVES, W. **The Eggs of** *Schistosoma bovis*, *S. mattheei* **and** *S. haematobium*. *J. Helminthology.* 1949, v. 23, Nos. 3/4, 127–34, 1 fig.

The eggs of *Schistosoma bovis*, *S. mattheei* and *S. haematobium* were compared by measuring samples of 500 of each species. The measurements included length, breadth and an additional dimension—the breadth of the egg at a point 50 μ from the non-spiked end. This third measurement expresses the degree of tapering or "spindling" in *S. mattheei* and *S. bovis*, which is more marked in the latter species. It is shown statistically that it is possible to differentiate the three kinds of eggs. Thus, "normal *S. haematobium* and *S. bovis* eggs should never be wrongly classified as belonging to the other species. There is a three per cent chance of wrongly classifying *S. bovis* as *S. mattheei*, and a one and one-half per cent. chance of classifying *S. mattheei* as *S. bovis*. While an egg of *S. mattheei* should not be regarded as that of *S. haematobium* there is a half per cent. chance of misclassifying a *S. haematobium* egg as a *S. mattheei*." *J. J. C. Buckley*

SCHREIBER, Freda G. & SCHUBERT, M. **Results of Exposure of the Snail** *Australorbis glabratus* **to varying Numbers of Miracidia of** *Schistosoma mansoni*. *J. Parasitology.* 1949, Dec., v. 35, No. 6, Sect. 1, 590–92.

"1. *Australorbis glabratus* snails were exposed to miracidia of the trematode, *Schistosoma mansoni*, under uniform controlled conditions.

"2. Snails exposed to one, three, seven and twelve miracidia demonstrate an increasing percentage of cercariae-producing snails as a result of increasing numbers of miracidia used for exposures.

"3. At exposure levels of one to seven miracidia per snail decreasing but still significant percentages of snails fail to shed cercariae ten weeks after exposure."

FILES, Virginia S. & CRAM, Eloise B. **A Study on the Comparative Susceptibility of Snail Vectors to Strains of** *Schistosoma mansoni*. *J. Parasitology*. 1949, Dec., v. 35, No. 6, Sect. 1, 555–60, 1 fig.

The authors exposed *Biomphalaria boissyi* [*Planorbis boissyi*] from Egypt, *B. pfeifferi* [*P. pfeifferi*] from Liberia, *Australorbis glabratus* from Porto Rico, Venezuela and Brazil respectively, to infection with four different strains of *Schistosoma mansoni* namely: from Porto Rico, Venezuela, Egypt and a Brazilian-Porto-Rican parasite cross strain. The results of these exposures revealed striking differences in the susceptibility of the snail vectors to the various strains.

A. glabratus (Porto Rico), became infected with all the strains in the following proportions: 46 per cent. with Porto Rican strain (animal); 38 per cent. with the Porto Rican strain (human); 44 per cent. with the Venezuelan strain; 37 per cent. with the Brazilian-Porto-Rican cross strain and only 9 per cent. with the Egyptian strain.

A. glabratus (Venezuela) also became infected with all the strains and showed a low susceptibility (7 per cent.), to the Egyptian strain.

A. glabratus (Brazil), could not be infected with all the strains. It failed to become infected with the Venezuelan, the Egyptian and the Porto Rican (animal) strains and only 7 per cent. became infected with the Porto Rican (human) strain. But 41 per cent. became infected with the Brazilian-Porto-Rican cross strain.

B. pfeifferi (Liberia), was easily infected with four strains, the Porto Rican (animal) 38 per cent.; the Venezuelan, 65 per cent., the Brazilian-Porto-Rican and the Egyptian.

B. boissyi (Egypt), became infected only with the Egyptian strain at the rate of 30 per cent.

Commenting on these results the authors conclude that the Brazilian *A. glabratus* though morphologically identical, is physiologically different from *A. glabratus* of Venezuela and Porto Rico. The contrast between the susceptibility of *B. pfeifferi* from Liberia and *B. boissyi* from Egypt to strains of *S. mansoni* in the Western Hemisphere supports the theory that *S. mansoni* was originally imported to that region from West Africa. The successful infection by VOGEL of *A. glabratus* with a West African strain of *S. mansoni* further supports it [this *Bulletin* 1942, v. 39, 563]. *J. J. C. Buckley*

GELFAND, M. **The Diagnosis and Prognosis of Schistosomiasis.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 945–58, 4 figs. [40 refs.]

In this article is incorporated much material already published by the author on the subject [this *Bulletin*, 1948, v. 45, 796 and 913; and 1949, v. 46, 56, 266, 267, 378, 644 and 846]. He correlates his own extensive observations with those of other workers elsewhere, and in doing so gives a comprehensive account of the diagnosis and of the prognosis of human schistosomiasis due to *Schistosoma haematobium* and to *S. mansoni*. The subject is not one which lends itself to brief summary and so this paper should be read in the original by those interested. *A. R. D. Adams*

DA SILVA, J. R. & DA COSTA, P. D. Os testes intradérmicos e outras reações biológicas no diagnóstico da esquistossomiase mansoni. [**Intradermal and other Tests in Diagnosis of Schistosomiasis mansoni.**] *Med. Cirurg. Farmacia*. Rio de Janeiro. 1949, Sept., No. 161, 497–506. [21 refs.]

After referring to results of complement fixation, precipitin and intradermal tests recorded by others in *Schistosoma mansoni* infestation the authors speak

of their own findings in intradermal tests, using as antigens preparations of the hepato-pancreas of infected intermediate hosts, *Australorbis glabratus*, or of cercariae obtained from the Bilharzia Research Laboratory, in Salisbury, Southern Rhodesia. The cercarial antigen seemed to be the more specific of the two.

Of 63 suspected patients, 51 reacted positively; 59 were proved by faecal examination or rectal biopsy to be, or to have been, infested, but nine had received treatment for the disease; the other four suspects showed eosinophilia and splenomegaly and came from highly endemic parts of Distrito Federal. Of the 50 actually passing ova at the time or positive by rectal biopsy, 42 reacted positively, six were doubtful and two negative. Of the nine who had had treatment more than a year before, five were positive and two each doubtful and negative. As for the four who had reacted positively, but with faeces and biopsy negative, it was thought that the female worms had been killed by treatment and only males remained, or the parasites had been eradicated and the reactions were residual. Fifteen control patients gave no response to the test. *H. Harold Scott*

DA SILVA, J. R. Estudo clínico da esquistossomose mansoni (doença de Manson-Pirajá da Silva). [**Clinical Study of** *Schistosoma mansoni* **Infection.**] *Rev. Serviço Especial de Saúde Publica.* Rio de Janeiro. 1949. Oct., v. 3, No. 1, 438 pp., 54 figs. (3 coloured). [692 refs.]

The exhaustive nature of this monograph is reflected in the fact that it occupies just under 400 pages and contains no less than 692 references. Indeed the word "clinical" is used in the widest sense, for it covers a great deal of biological, pathological and biochemical ground: and at each stage, detailed figures are given, either in support of the author's findings or as a record of the findings of other workers.

The monograph opens with a brief historical and geographical résumé: there is then given the topographical distribution of *Schistosoma mansoni* infection in Brazil, illustrated with maps and accompanied by a complete list of local findings, in States and districts, which shows the name of the investigator, the year, the number of cases seen and the percentage of positives. This remarkable piece of industry occupies five pages in the smallest type.

The author then discusses the cycle in the snail host and passes to the pathogenesis of the disease: here, in great detail and with some excellent photomicrographs, is described the pathology in the spleen, liver and other organs.

The next chapter deals with symptomatology as it concerns the different systems, and the clinical classification of the disease. A scheme of classification is given, in which the disease is divided into active and inactive forms: these in turn are each divided into non-symptomatic and symptomatic, and the latter further divided into malignant and benign forms. In addition, acute and chronic varieties of the active symptomatic group are shown. This long chapter contains many detailed case histories, tables showing incidence of various symptoms, lesions of different organs and systems and detailed tables of results of diagnostic methods.

Diagnosis is next discussed. In addition to examination of faeces, urine and bile, the various serological and skin tests are dealt with, as are endoscopy, biopsy and radiological examination. Many illustrations of ova are given and the technique of biopsy methods described. Biochemical tests, including urinary and liver function tests are described in detail, and blood findings are dealt with. Case histories, tabulated results and electrocardiogram tracings are given in support of these features.

After a brief chapter on prognosis, the author turns to prevention and treatment, dividing the former into (1) eradication of intermediate hosts, (2) treatment of infected persons and (3) protection of the healthy. As might be expected in a clinical study (1) is only dealt with very briefly; but therapeutic methods are covered at very great length. The drug used, intensive and other courses, and combinations of drugs are gone into in detail; the results of other workers are tabulated under the treatments employed, and illustrative cases are given. Surgery, including splenectomy, is discussed. This chapter covers a great deal of the ground up to the time of writing (the most recent references are 1948) and includes references to work on Miracil.

The list of references, while it naturally contains the names of a large proportion of South American workers, covers a wide international field and the familiar names of investigators in schistosomiasis are noted throughout.

This is an extremely useful record, well-produced and illustrated, and quite evidently the result of a vast amount of industry. Because of the amount of illustrated and tabulated matter it will be of interest to many workers who are not familiar with the Portuguese language.

It is a pity that so large and so admirable a work should contain no table of contents, index or running headings; so that a reader requiring to look up some particular feature must turn laboriously through some 400 pages to find it.

H. J. O'D. Burke-Gaffney

ARMBRUST, A. de F. Miocardite esquistossomotica (forma granulomatosa). Nota prévia. [**Bilharzial Myocarditis Granulomatous Type**).] *Hospital*. Rio de Janeiro. 1949, Aug., v. 36, No. 2, 213–18, 5 figs.

The English summary appended to the paper is as follows :—

"The author presents an autopsy case whose histopathologic examination showed many bilharzial tubercles in the myocardium, each one containing a single egg.

"The gross aspect of the heart was normal, except for the hypertrophy of the right ventricle (15 mm). Besides a scarce focal inspecific infiltration of lymphocytes and eosinophils, there were multiple small areas of necrosis with a central egg, surrounded by epithelioid cells, lymphocytes and eosinophils. Eggs were seen in the lumen of blood vessels.

"This type of myocarditis is different from the type frequently met and described by Venezuelan writers as "Bilharzial myocarditis" in which, in the macroscopic as well as in the microscopic examination, no specific changes are seen.

"He was able to find in the literature no more than three other undoubtful cases of *Schistosoma mansoni* eggs localized in human myocardium (one of Clark & Graeff and two of Jaffé) and believes his own case to be the first to be found in Brazil."

NEWSOME, J. **A Simple Test of Cure in** *B. haematobium* **Infections.** *J. Roy. Egyptian Med. Ass.* 1949, Oct., v. 32, No. 10, 737–40, 1 fig.

The idea of this method was suggested to the author by the miracidiascope of the Southern Rhodesian workers [this *Bulletin*, 1948, v. 45, 258].

The method is described in detail and illustrated by a [not very clear] photograph. It is noted that the patient is required to take some short period of exercise before the specimen of urine is passed, as advocated by BENNIE [this *Bulletin*, 1949, v. 46, 555].

The apparatus consists essentially of a microscope from which the eyepiece, tube, lens changer, condenser and mirror are removed: the microscope is then pulled back to the horizontal position and a lens of 3·5–4 cm. diameter having a focal length of about 3 cm. is inserted in the place of the condenser. A glass cell of 5 cc. capacity is placed on the mechanical stage and a lamp (6 v., 5 amp.) directed on to it, through the lens and on to a screen about six feet away. The contents of the cell are focussed by means of the substage rack and pinion.

The washed sediment from the specimen of urine is placed in the cell; miracidia may readily be seen on the screen in a partly darkened room. In doubtful cases (for example where only a single swimming miracidium is detected) use of a 1 cc. cell will provide a sharper image. Blackened dead eggs and empty egg shells may also be identified in this way.

The urine specimen is prepared as follows:—

The original specimen is left to sediment for two hours: the supernatant urine is removed and about 5 cc. of sediment is left. This is centrifuged at less than 1,000 revolutions for one minute. The supernatant is removed and 5 cc. or more of water added: centrifugation and decanting is repeated and finally 2 to 4 cc. of fresh water are added. The washed sediment is left to stand for at least 30 minutes before it is placed in the cell. [If there is very little sediment, washing is omitted and 2 cc. of water added after the first supernatant urine has been removed.]

Each patient is examined on three successive days. Of eight urines repeatedly found negative by ordinary microscopy, three were found positive by the above method on first examination: no urines positive by microscopy were found negative.

The author suggests that no more time need be spent on each specimen than is devoted to a careful microscopic examination: but attention to detail is necessary. *H. J. O'D. Burke-Gaffney*

ABBOTT, R. T. & HUNTER, G. W. **Studies on Potential Snail Hosts of** *Schistosoma japonicum*. **I. Notes on the Amnicolid Snails** *Blanfordia*, *Tricula* **and a New Genus,** *Fukuia* **from Japan.** *Proc. Helminthological Soc. of Washington.* 1949, July, v. 16, No. 2, 73–86, 22 figs. & map on 3 pls. [34 refs.]

"In order to identify certain potential snail hosts of *Schistosoma japonicum* in infection experiments in Japan, a study is made of the shells, animals and habitats of four molluscan species. *Blanfordia simplex* Pilsbry, 1902, and *Tricula minima* (Bartsch, 1936) (formerly placed in the genus *Schistosomophora* Bartsch, 1936) are redescribed. A new genus, *Fukuia*, of the subfamily Hydrobiinae, is described with two new species, *F. kurodai*, the selected genotype, and *F. multistriata*. A key is given to the animal characters of the intermediate hosts of Oriental schistosomiasis and genera likely to be confused with them. Recent or generally overlooked additions to the bibliography of *Oncomelania* are given."

HUNTER, G. W. & ABBOTT, R. T., with the technical assistance of C. PAN & Estelle STRAY. **Studies on Potential Snail Hosts of** *Schistosoma japonicum*. **II. Infection Experiments on Amnicolid Snails of the Genera** *Blanfordia*, *Tricula* **and** *Fukuia*. *Proc. Helminthological Soc. of Washington.* 1949, July, v. 16, No. 2, 86–9.

"A careful check of records, medical groups and indigenous persons failed to reveal the existence of cases of schistosomiasis japonica in Fukui and Ishikawa Prefectures. A search for *Oncomelania nosophora* failed to yield any specimens.

Other possible snail hosts of Fukui and Ishikawa Prefectures were examined by crushing and by exposure to miracidia of *S. japonicum*. *Blanfordia simplex*, *Tricula minima*. *Fuzuia multistriata* and *F. kurodai* were tested and found incapable of serving as intermediate snail hosts of *S. japonicum*."

LING, C. C., CHENG, W. J. & CHUNG, H. L. **Clinical and Diagnostic Features of Schistosomiasis japonica. A Review of 200 Cases.** *Chinese Med. J.* 1949, July, v. 67, No. 7, 347–66. [58 refs.]

Schistosomiasis caused by *S. japonicum* is one of the most important parasitic diseases occurring in China. It is not confined to the lower Yangtse valley, but occurs extensively throughout it and also is highly endemic elsewhere in China and in Formosa. A modest estimate of over five million infected persons has been arrived at in different surveys based solely on stool examinations. The present paper is an analysis of the disease as encountered in 200 persons studied in two hospitals in Shanghai between 1935 and 1947; in 175 (87·5 per cent.) of these cases the diagnosis was established by the recovery of ova from the stools, in the remainder ova were recovered on biopsy. A technique for finding miracidia hatched from stool specimens proved of diagnostic value in cases which failed to yield ova in the stools on direct examination or after a sedimentation technique. In treatment tartar emetic was found considerably more effective than Fouadin, which proved a disappointing drug. One case only was treated with an intensive two-day course of potassium antimony tartrate (12 mgm. kgm.): as this treatment led rapidly to death from acute toxic necrosis of the liver the authors conclude that it is dangerous in a disease, such as this, where there is already liver damage.

[It is not possible to summarize the very considerable amount of detailed information in this paper. While it breaks no new ground it gives an excellent account of eastern schistosomiasis, and as such should be consulted by those interested.] *A. R. D. Adams*

HUNTER, G. W., BENNETT, H. J., FRY, N. H., SEE, J. & GREENE, E. **The Control of Schistosomiasis japonica. V. Studies on the Penetration of various Types of Unimpregnated Uniform Cloth by Cercariae of** *Schistosoma japonicum*. *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 723–37, 7 figs. [20 refs.]

"1. A total of 204, or 41·8 per cent. of the 487 tests run on samples of Army uniform cloth were positive for the passage of small numbers of cercariae of *S. japonicum* through the cloth.

"2. The actual number of viable cercariae of *S. japonicum* that succeeded in effecting a penetration of the samples of Army uniform cloth tested in the *in vitro* experiments was low. Only 652, or 2·63 per cent, of the 24,350 cercariae used in these experiments penetrated the cloth compared with 62·5 per cent of the controls.

"3. The results of the *in vitro* experiments show that the different types of cloth permitted the passage of cercariae in increasing numbers in the following order: Water resistant sateen—new; water resistant sateen—washed four times; herringbone twill—old fatigue cloth; cotton khaki twill—old trousers; cotton khaki twill—new trousers; herringbone twill—new fatigue cloth; woolen O.D. trousers—new; cotton khaki twill—new shirt; woolen O.D. trousers—old; woolen O.D. shirt—new; cotton khaki twill—old shirt; woolen O.D. shirts—old.

"4. Evidence is presented to show that when pressure is applied to pieces of test cloth greater numbers of the tests become positive and greater numbers of cercariae are successful in penetrating the cloth.

"5. The recovery of adults of *S. japonicum* from mice exposed to cercariae that had successfully penetrated samples of test cloth suggests that these parasites are still capable of infecting man.

"6. Adult schistosomes were recovered from mice that had been exposed to cercariae-infested water protected only by bags of test cloth. The number of adults recovered was essentially the same as those recovered after exposure to cercariae that had penetrated the cloth in the *in vitro* experiments.

"7. It is evident from the foregoing experiments that all types of Army uniform cloth afford some degree of protection to the wearer. Herringbone twill (fatigue cloth) and khaki cotton twill would appear to give slightly better protection than new woolen O.D. material. However, *any* uniform trouser material would protect the legs provided it was tucked into the top of combat boots and enough slack was present to form a cuff over the boot top."

LING, C. C. & TAUR, S. S. **A Fatal Case of *Clonorchis sinensis* Infestation.** *Chinese Med. J.* 1949, Aug., v. 67, No. 8, 414–20, 3 figs. on 2 pls. [15 refs.]

"A fatal case of *Clonorchis* infestation with complete autopsy findings is reported. The diagnosis was entirely missed clinically but made by liver aspiration performed immediately after death, which yielded more than 20 worms. At autopsy altogether more than 900 worms were recovered. The diagnostic features are briefly reviewed. Among the characteristic pathological changes found the most significant one consists of superficially located thick irregular and tortuous cords of greatly dilated bile ducts giving rise to the uneven and roughened surface of the liver."

BASNUEVO, J. G. Cloroquina y clonorchiasis (II). [**Chloroquine and Clonorchiasis (II).**] *Rev. Kuba Med. Trop. y Parasit.* 1949, July–Aug., v. 5, Nos. 7/8, 105–10. [14 refs.]

The English summary appended to the paper is as follows :—

"The author reports on five cases of Clonorchiasis treated with Chloroquine (Tanakán).

"Two cases appear to be completely cured, because after the treatment eggs of Clonorchis sinensis disappeared from feces and bile in repeated examinations.

"The first one of these before treatment presented 32 eggs of Clonorchis in 1 cc. of bile (4,480 in 140 cc. of bile).

"The other three cases did not respond to the treatment. (Not cured cases.)

"Chloroquine was administered in dosages as follows :

"Four tablets of 0·25 Gm. per day for 3 days.

"Two tablets of 0·25 Gm. per day for 20 days.

"Total doses : 13 Gm. of Chloroquine diphosphate."

MATTES, O. Wirtsfindung, Invasionsvorgang und Wirtsspezifität beim *Fasciola-Miracidium*. [**Host Preferences and Specificity in Miracidia of Fasciola.**] *Ztschr. f. Parasitenk.* 1949, Dec. 31, v. 14, No. 4, 320–63, 5 figs. [27 refs.]

KENDALL, S. B. **Nutritional Factors affecting the Rate of Development of *Fasciola hepatica* in *Limnaea truncatula*.** *J. Helminthology.* 1949, v. 23, Nos. 3/4, 179–90, 1 fig. [11 refs.]

"1. This paper describes some hitherto unrecorded aspects of trematode development in a molluscan host.

"2. It is shown that the rate of development of *Fasciola hepatica* in its host *Limnaea truncatula* is influenced not only by temperature but by the amount of food assimilated by the snail and by the number of rediae which are in competition within a single host.

"3. The most rapid development of the parasite will occur in hosts which have access to ample supplies of food and in which moderate numbers of rediae become established. At laboratory temperatures, infection with a single miracidium rarely leads to the establishment of more than 40 rediae, a number which is apparently adjusted to the economy of the host, since it allows development at a maximum rate."

GOLYANITSKAYA, O. N. [**Occurrence of** *Opisthorchis felineus* **in the Human Lung.**] *Problemi Tuberkuleza.* Moscow. 1945, No. 3, 57–8. [In Russian.]

Opisthorchis felineus is normally found in the gall bladder, bile ducts and pancreas. An unusual case of opisthorchiasis is reported by the author.

The patient, aged 33, was born in Omsk and admitted to hospital in Moscow with a history of two months' illness. He was gravely ill with generalized oedema, weakness, dyspnoea and cough with sputum. Clinically there were signs of widespread tuberculous infiltration of the lungs. He died eight days later from heart failure.

At autopsy there was extensive involvement of the lungs with active primary tuberculosis, and miliary lesions in other organs. The bile ducts were plugged with large numbers of parasites.

On histological section some distortion of the lobular pattern of the liver was found. The veins were dilated and contained numerous helminth eggs. The walls of the arteries were thickened and in parts hyalinized with obliteration of the lumen. Small caseating tubercles were distributed throughout the organ. The bile-duct epithelium was hypertrophied and the cells disorganized. In parts there was actual destruction of bile ducts, accumulation of parasites and overgrowth of connective tissue.

There was diffuse exudate throughout the lungs and large caseating areas on the periphery. A section through one of the less affected parts of the lung passed transversely through the body of a single *Opisthorchis felineus*, lying in, and occupying the whole of, the lumen of a blood vessel.

This case is of considerable interest as the finding of *Opisthorchis* in the lung has not previously been reported. *M. T. Gillies*

STUNKARD, H. W. *Diphyllobothrium stemmacephalum* **Cobbold, 1858 and** *D. latum* (**Linn., 1758**). *J. Parasitology.* 1949, Dec., v. 35, No. 6, Sect. 1, 613–24, 5 figs. [30 refs.]

"The taxonomic history of the broad tapeworm of man, *Diphyllobothrium latum*, is traced. Its relation to *D. stemmacephalum* Cobbold, 1858, type of the genus, is discussed. Type material of the latter species has been restudied and compared with other diphyllobothrid species. Although the genus *Diphyllobothrium* as now constituted comprises a large and heterogeneous collection of species, the features on which valid generic concepts can be formulated within the group are not yet clear."

MARKOWSKI, S. **On the Species of** *Diphyllobothrium* **occurring in Birds, and their relation to Man and other Hosts.** *J. Helminthology.* 1949, v. 23, Nos. 3/4, 107–26, 11 figs. [Numerous refs.]

"A comparative study has been made of certain species of *Diphyllobothrium* which are primarily parasites of birds, but which have been obtained from

man and other hosts, both naturally and experimentally. As a result of this work it appears that only two valid species are known in birds, namely: *Diphyllobothrium dendriticum* (Nitzsch, 1824) and *D. ditremum* (Creplin, 1825). These species differ markedly from each other in certain morphological features and there appears to be a noticeable difference in their host-adaptation, inasmuch as *D. ditremum* occurs only in birds belonging to the families Phalacrocoracidae, Ardeidae, Colymbidae and Anatidae, while *D. dendriticum* occurs naturally in birds belonging to the Laridae and other families, and experimentally also in mammals.

"It appears that *D. dendriticum* is capable of being a natural parasite of man, and therefore may be of medical importance in special circumstances.

"Finally, *Mergus americanus* is recorded as a new host for *D. ditremum*, and *Larus delawarensis* for *D. dendriticum*."

NOR ELDIN, G. & BAZ, I. I. **Incidence of Cestode Infections among Egyptians.** *J. Roy. Egyptian Med. Ass.* 1949, Sept., v. 32, No. 9, 666–79, 1 chart.

The order of preponderance of cestode infections in Egypt is *Hymenolepis nana*, *Taenia saginata*, *H. diminuta* and *T. solium*. In the three age groups—under 10 years, 10 to 15 years and over 15 years, the incidence of *Hymenolepis* infections (based on between one and two thousand examinations in each age group) was 17·4, 9·8 and 1·7 per cent., and of *Taenia* infections 3·8, 2·5 and 2·2 per cent. The former infection is thus very strikingly affected by the age of the patient and the latter to a far lesser extent. In only one instance was *T. solium* found and in this case there was a double *Taenia* infection. *H. diminuta* was only found on four occasions.

There is a discussion on the factors that affect parasitization by *Hymenolepis*, and the work of CHANDLER, of ADDIS and of LARSH is quoted. The authors appear to consider that the habits of children and the fact that many are ill-nourished determine the high infection rate among them. They consider that contamination of their fingers and the infections acquired from lavatory seats and towels are the main source of infection. They do not consider that rats play any important part in the epidemiology since *H. nana* is difficult to establish in rats and *H. nana* var. *fraterna* is uncommon in man.

The adult *Hymenolepis* that they found were mostly a small thin variety—0·5 to 2·5 cm. with 20–21 hooklets and 100–250 segments. They consider that the nutrition of the host influences the size of the worms. *L. E. Napier*

SOFIA, F. Studio sull'anchilostomiasi in Eritrea. [**Ankylostomiasis in Eritrea.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1949, v. 9, No. 3, 249–65, 1 map. [20 refs.] English summary.

The author notes that previous records have ascribed hookworm infestation in Eritrea to *Ancylostoma duodenale*, but more than half the patients studied by him were infested with *Necator americanus*. The present account is based on only 80 cases seen "in less than a year" [so stated in one place; in another he says "within the 18 months from February, 1948, to July, 1949"]. Naturally, the deductions from so few cases might have to be modified by a more thorough and prolonged study; suffice it to say that the author found more than one-third, 37·5 per cent. [the figures throughout are expressed only as percentages], in those between 10 and 20 years of age, 23·5 in the third decade and 22·5 in the fourth. The percentage is given also for each of

28 localities in Eritrea. The month of heaviest rainfall is August, 116·9 mm., next July with 82·9, September with 76·4 and June with 53·5, which favour the development of the larvae. In a table are given details of the blood condition of 30 patients; other diseases found were malaria, benign and malignant tertian, undulant fever, and also helminthic infestations, syphilis and conditions of innutrition. Treatment was by carbon tetrachloride. Short sections dealing with symptoms and pathogeny contain nothing fresh.

H. Harold Scott

TANG, C. C. **Sweet-Potato Cultivation and Hookworm Disease in Fukien, South China.** *Amer. J. Hyg.* 1949, Sept., v. 50, No. 2, 236–62, 8 figs. [30 refs.]

An investigation into the local hookworm infection was undertaken at three places on the South-East coast of Fukien Province of China south of Foochow, namely at Changloh, Lungtien and on the island of Pingtang. This area lies between 25° and 26° N. and 121° and 122° E. The mean temperature is between 25° and 30°C. from June to September and there is a high average annual rainfall, 1,400 to 1,600 millimetres, with two peaks, in June and August, respectively.

Fresh faecal specimens were examined, first by the smear method and if eggs were found an egg count was made by Stoll's method; the egg counts were reduced to a basis of formed stool. The Talqvist scale was used for haemoglobin estimates and a modified Baermann's apparatus for soil examination for larvae.

In a total of 788 patients, infection rates of 75·8, 83·3 and 86·8 per cent. in the three areas were found. The egg counts were respectively 2,522, 2,691 and 4,265 eggs per gramme of faeces. In the four egg count groups, 1–399, 400–2,999, 3,000–9,999 and 10,000 there were, respectively, 37, 279, 194 and 32 cases. Analysed according to patients' age, the figures showed 36, 85·5, 80·6, 83·3 and 84·7 respectively in the first five decades, and 62·5 in the 51 and over age group, in Changloh; in the other areas, the figures showed a similarly even age distribution.

Many patients showed the typical yellow, puffy faces and oedematous feet; they complained of palpitations, shortness of breath, coughing and dizziness. In Pingtang, the average haemoglobin percentages of patients in the egg-count groups "negative", 1–999, 1,000–1,999, 2,000–2,999, 3,000–4,999, 5,000–9,999, and 10,000–45,000 were, respectively, 59, 63·3, 51·2, 48, 43·8, 39·8 and 24·8, but there were a few with a typical clinical picture who showed no, or very few, eggs. The correlation table showed a coefficient of $-0{\cdot}748 \pm 0{\cdot}026$ between haemoglobin percentage and hookworm load.

Of the 819 worms examined, 96·3 per cent. were *Ancylostoma duodenale*; no *A. caninum* or *A. braziliense* were found.

Examination of the soil from various sources showed that the sweet-potato nurseries showed the highest contamination with larvae, followed closely by the sweet-potato fields. In samples from two nurseries, eight out of eight and nine out of fifteen samples were found infested with averages of 254 and 1,568 larvae. Samples from other sources showed lower infestation rates and smaller numbers of larvae. Night soil, often fresh, is added to the fertilizer, and the fertilization of the nursery beds is very intense.

The only preventive measure that can be applied immediately is a treatment campaign. This by itself would not be sufficient, and it is suggested that the destruction of hookworm eggs by storing the faeces or by adding some chemical substance that itself is a useful fertilizer to destroy the eggs is the most promising measure.

The author concludes by pointing out that this is a most serious health problem involving at least 1,400,000 persons in Fukien alone. *L. E. Napier*

STEWART, I. S. **Human Infestation with** *Trichostrongylus* **in South Persia.** *Brit. Med. J.* 1949, Oct. 1, 737–8.

In an investigation on the intestinal worm infections of labourers employed by the Anglo-Iranian Oil Company, it was at first believed that about 25 per cent. were infected with hookworm. This was surprising in view of the nature of the country. It was, however, noted that the supposed hookworm eggs were of two kinds. Other eggs found in large numbers among 1,000 specimens were *Ascaris*—266, *Trichuris*—87 and *Hymenolepis nana*—20.

On further investigation, in 500 specimens, 16 showed true *Ancylostoma* ova and 324 another kind of ovum. No adult worms were recovered even at post-mortem examinations, which were rare.

In 30 stool specimens from sheep, ova identical with those found in man were observed and in five instances adult worms were discovered.

The proof of the identity of the second type of ovum was not complete, but it was believed to be that of *Trichostrongylus*, since "(1) The climate is not one in which the life cycle of *Ancylostoma* could favourably be completed; (2) the wearing of shoes and boots renders invasion of the skin by *Ancylostoma* larvae improbable; (3) "ground itch", associated with skin invasion by *Ancylostoma* larvae, is not seen; (4) mass infestation by *Ancylostoma* yields a considerable proportion of cases of grave anaemia; (5) anthelmintic drugs have been found to be almost useless in eradicating the worms; (6) the ova agree in every detail with the published description of *Trichostrongylus*; and (7) ova identical with those found in man were observed in a series of sheep examined."

Among 150 labourers diagnosed as suffering from hookworm, before the above observation had been made, only six had haemoglobin values below 10 grammes per cent., and only one below 7 grammes; these six were probably all suffering from true hookworm infections.

Few of the labourers were in close contact with sheep or goats and it is thought that the infection was being passed from man to man.

Among 40 healthy local school children, 31 were found to be passing *Trichostrongylus* ova. *L. E. Napier*

PEÑUELA ROZO, A. Complicación pulmonar de las infestaciones parasitarias. [**Pulmonary Complications of Parasitosis.**] *Rev. Facul. de Med.* Bogota. 1949, Aug., v. 18, No. 2, 65–86. [40 refs.]

This is a thesis presented, presumably, for the doctorate of the University of Tulane. The author starts his thesis with the statement that animal parasites may cause pulmonary complications in three ways: 1. By passage of larvae migrating *via* the lungs; 2. By direct action of the parasite in its adult, larval or egg stage; 3. By indirect action of its toxins or by anaphylaxis. He then goes on to say that he is limiting his remarks to one only of the many parasites, namely *Strongyloides stercoralis*, comparing its action with that of *Ascaris lumbricoides*. He gives an account, sketchily, of its history, geographical distribution, life-cycle, modes of infestation, pathological anatomy, diagnosis, treatment and prevention, and ends by saying that Loeffler's syndrome is commonly an allergic reaction to *Ascaris* larvae. [The thesis is made up solely of references to the literature, without a single original observation.]

H. Harold Scott

CAMPO POSADA, A. Ascaridiosis de las vias biliares. [*Ascaris* **in the Biliary Tract.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, July–Aug., v. 5, Nos. 7/8 113–17.

The author briefly reviews the literature of "ectopic ascariasis" and describes five cases which he saw in Colombia in which this parasite was found during the course of operation.

In each case, the clinical condition suggested cholecystitis or gall stones and the worm was encountered when the biliary tract was opened. *Ascaris* eggs were found in the stools in three cases, but, as the author points out, the coexistence of this intestinal infestation with various biliary infections is common in Colombia and the presence of eggs in the stools would not of itself necessarily suggest biliary ascariasis. The author states that diagnosis cannot indeed be made by the usual methods and therefore the need for surgical intervention cannot readily be anticipated. In the present cases, acute symptoms were the first indications of the condition: one patient was in a very toxic state and died two days after operation.

The author discusses the pathology of the condition and the mechanism of invasion of the biliary tract by the *Ascaris*. There are only two possible portals of entry—directly *via* the duodenum or indirectly through the blood stream. The former seems the simpler and more logical route, but in that case one would expect to find the worm at least as frequently in the duodenum itself. The author favours the view that the parasite travels to the biliary tract through the blood while in the larval state and adapts itself nutritionally therein. His view is strengthened by the clinical observations and the absence of previous symptoms of acute biliary obstruction in his patients, although all the worms found were in the adult stage. He suggests that the question might be settled by a study of the development of the larvae in a bile medium and he proposes to make and report on such a study.

Most of the parasites found were dead; and the author suggests that this might be explained by the elimination through the liver and bile of the anthelmintics and anaesthetics employed.

Full clinical details are given of the five patients whose ages ranged from 28 to 58: four of them made good recoveries after operation.

H. J. O'D. Burke-Gaffney

ALVES, J. B. de R. *Ascaris lumbricoides* no colédoco. [*Ascaris lumbricoides* **in the Bile Duct.**] *Hospital.* Rio de Janeiro. 1949, Oct., v. 36, No. 4, 573–5, 1 fig.

The author, in Brazil, describes the case of a patient who had his gall bladder removed in 1942 because of its having been ruptured. He developed a biliary fistula, which closed spontaneously.

In 1945, he presented signs of biliary lithiasis and operation revealed the presence of many stones in the bile duct. In 1948, he presented himself again with manifestations suggesting a recurrence of the stones and laparotomy was performed. The bile duct had increased in size and was found to contain four calculi and a dead *Ascaris lumbricoides* (these are shown in a photograph). The patient made a good recovery after operation, followed by an anthelmintic.

H. J. O'D. Burke-Gaffney

SCHLOSSER, R. J. **Photomicrographs of the Developing Larvae of** *Wuchereria bancrofti* **in a Mosquito Host of the South Pacific Area.** *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 739–45, 20 figs. on 2 pls.

A simple method of making photomicrographs and its use in illustrating the developing stages of *W. bancrofti* in experimentally infected mosquitoes is

described. Laboratory-bred specimens of *Anopheles farauti* were given infective blood meals from two native people from the Island of San Cristobal. The mosquitoes were dissected daily up to 17 days and the living unstained larvae were photographed. The infective stage (1·8mm. long) was reached after 14½ days. It is thought that *A. punctulatus* is also a vector in this area. *J. J. C. Buckley*

MALHOTRA, S. L. **Filaria and Loeffler's Syndrome.** [Correspondence.] *Lancet.* 1950, Jan. 28, 181–2.

A report of four cases in India.

BRICEÑO ROSSI, A. L. & HEWITT, R. **Treatment of Bancroftian Filariasis with "Hetrazan" in Puerto Cabello, Venezuela.** *Southern Med. J.* 1949, Nov., v. 42, No. 11, 978–81.

The treatment with hetrazan of 16 patients with filariasis in Venezuela is described. The dosage was 2·0 mgm. per kgm. three times daily for one to four weeks. All became free from microfilariae in the blood and in only one did the microfilariae recur two to nine months after treatment. In seven out of ten cases with clinical lesions due to the filariasis, clinical improvement is considered to have occurred. No direct toxic symptoms were seen, and allergic reactions were mild. Two of the patients passed many *Ascaris* during treatment.

F. Hawking

HEWITT, R. **Mass Therapy with "Hetrazan" as a Control Measure for Bancroftian Filariasis on St. Croix, American Virgin Islands.** [Correspondence.] *Nature.* 1949, Dec. 31, 1135–6.

The author, writing from the Lederle Laboratories Division of the American Cyanamid Company, undertook a programme of mass treatment with "Hetrazan" on St. Croix in the spring of 1948. The object was to reduce microfilaraemia in those harbouring *Wuchereria bancrofti* so that sub-infective levels for mosquitoes would be obtained.

The population of the island is between 12,000 and 14,000. In a survey of 977 persons, an infection rate of 15·9 per cent. was found when 60 cmm. blood samples were used.

After trial tests of varying oral doses, the dosage of "Hetrazan" decided upon for the mass campaign was 100 mgm. tablets for adults and 53 mgm. tablets for children over five years: these were given three times daily for seven days. Before the treatment was begun, the programme was explained extensively by wide propaganda and educational methods. "Hetrazan" was then given systematically on an island-wide basis, first in schools and then in towns, villages and rural communities. In schools, treatment was supervised but adult groups were for the most part unsupervised.

In three weeks, 7,781 individual treatment units were distributed and before the author's departure 2,520 units were left at the two hospitals.

On his return a year later as many as possible of the control group were re-examined as well as six selected communities. Of 65 control patients seen, 82 per cent. were negative for microfilariae and a reduction of 98 per cent. in total microfilaraemia was found. Of 471 persons in the six communities, 6·7 per cent. were positive, a reduction of some 60 per cent. over the 1948 findings in these areas. No counts greater than 14 microfilaria per 60 cmm. were found: 88·7 per cent. of positives showed 10 or less. This range is considered to indicate non-infectivity for mosquitoes. In the pre-treatment survey, counts as high as 360 microfilariae per 60 cmm. had been found and only 27·1 per cent. had shown 10 or less.

While it is stressed that all the islanders did not take " Hetrazan " and many probably did not take the full course, the author believes that the results effectively demonstrate the possibilities of mass therapy with " Hetrazan " for drastic reduction of mosquito infections in closely circumscribed endemic areas of bancroftian filariasis.

Systemic reactions were mild and fleeting and confined largely to those harbouring filariae : a few reported fever, malaise, headache and localized allergic reactions, but these are believed to have been due to release of filarial protein when the worms were killed. *H. J. O'D. Burke-Gaffney*

LUBRAN, M. **Estimation of " Hetrazan " in Body Fluids.** [Correspondence.] *Nature.* 1949, Dec. 31, 1135.

" Hetrazan " may be estimated by a " dye-laking " method similar in principle to the method developed by BRODIE and UDENFRIEND for organic bases.

The body fluid for test (*e.g.* serum or plasma) is made strongly alkaline with one-fifth its volume of 10*N* NaOH and extracted with 2–3 times its volume of ethylene dichloride. The ethylene dichloride layer is separated by centrifugation, filtered through Whatman No. 41 paper and shaken with one-fifth its volume (or more, in the case of urine) of 0·05 per cent. Bromthymol blue solution (made in phosphate buffer at *p*H 7·0).

Part of the Bromthymol blue combines with the " Hetrazan " base and dissolves in the ethylene dichloride, giving a yellow colour. This colour is matched against a standard solution of " Hetrazan " similarly treated.

Where the concentration of " Hetrazan " is less than 1 μgm./ml., the colour cannot accurately be determined colorimetrically. If a micro-colorimeter is available, a measured volume of the ethylene dichloride is extracted into 2 ml. of *N* NaOH and the blue colour compared with a standard solution : or a blue colour may be developed in the ethylene dichloride by adding 0·1 *N* alcoholic caustic potash and enough ethanol to prevent turbidity.

Where whole blood is extracted, or the proteins are removed by trichloracetic acid, normal bloods give a blank value of about 1 μgm./ml. The latter procedure also removes about 20 per cent. of added " Hetrazan ", so that it is better (though perhaps more tedious) to extract serum or plasma.

Urines show a blank value of about 5 μgm./ml ; but this figure may reach 20 μgm./ml. in concentrated urines.

The method is sensitive enough to measure a blood concentration of " Hetrazan " of 1 μgm./ml. It lacks specificity, but is useful in following concentration after oral administration.

It is intended to publish these experiments fully later, but it is noted that, typically, ingestion of 10 mgm./kgm. body weight of the hydrochloride results in a maximum plasma concentration of about 5–7 μgm./ml. in three hours. Within 24 hours as the level slowly falls to zero, some 20 per cent. is excreted in the urine, and after another 24 hours no more " Hetrazan " can be detected.

H. J. O'D. Burke-Gaffney

WILKINSON, P. R. **Some Observations on Microfilariae in Africans at Jinja.** *East African Med. J.* 1949, Nov., v. 26, No. 11, 344–6.

While engaged in a large-scale trial of DDT against malaria near Jinja, Uganda, the author made some observations on microfilariae. His reasons for reporting them are (1) the incidence (probably of *Onchocerca volvulus*)

appears to be higher than has been suspected, (2) infection is apparently related to degree of exposure to Simuliids, (3) manifestations may become more apparent among imported labour in the future, (4) examination of naturally engorging flies was used for obtaining microfilariae.

Seventeen unselected Africans obtained up to five fully engorged *Simulium damnosum* from their own skin. The blood meals were examined and five meals were taken from a subject before it was decided that he was infected with *O. volvulus*. It was unlikely that the abdomen of the flies contained worms from an earlier blood meal. The results shown in a detailed table indicate that 13 of the men showed positive results on some occasion. The times spent in the fly area and the dwelling places of the men are also shown. In three men, skin snips were also positive and in one, adult worms were taken from a subcutaneous cyst.

All the men were unaware of infection : no clinical data are presented, but the "impression was gained that the disease was rare and was seldom encountered or treated."

Dissection of the mouth parts of female *Simulium damnosum* failed to show infective stages in 14 unfed and 69 fed flies. Some of the fed flies may have lost their infective worms while feeding. Even if a low infectivity rate should be found in future work, the great frequency of biting by these flies should be taken into account. *H. J. O'D. Burke-Gaffney*

ASHBURN, L. L., BURCH, T. A. & BRADY, F. J. **Pathologic Effects of Suramin, Hetrazan and Arsenamide on Adult** *Onchocerca volvulus*. *Bol. Oficina Sanitaria Panamericana*. 1949, Nov., v. 28, No. 11, 1107–17, 7 figs. [11 refs.]

Thirty-four nodules were obtained from 21 patients who had received at least 0·14 gm. suramin per kgm., 16 nodules from nine patients who had received at least 20 mgm. hetrazan per kgm., and 11 nodules from three patients who had received 60 mgm. arsenamide daily for 15 days. Nineteen nodules from untreated patients served as controls. These were studied histologically. In the controls, most of the worms were alive. In the nodules removed within 60 days after treatment with suramin all the worms showed some degeneration and this increased during the subsequent period so that among the eight nodules removed between 121 and 323 days, seven contained only dead worms. Nodules removed within 60 days after treatment with hetrazan showed no more degeneration of the worms than the controls did ; the nodules removed 60–90 days after hetrazan showed slightly more degeneration. Among the nodules removed after arsenamide, nine showed complete suppression of reproduction, but none of the worms appeared dead. Three features which were absent in the controls but present among the nodules from treated patients were : sheathing of the worms by histiocytes, frequency of foreign-body giant cells and the presence of few to many foreign body granulomata. Microfilariae were absent from nodules in which the worms were markedly degenerate. It is concluded that suramin has a definite lethal effect upon the adult *Onchocerca* although this is most conspicuous only 120 days after treatment. The evidence about hetrazan is not conclusive ; but its action on the adult worms is definitely less than that of suramin. Arsenamide deserves further trial. [The treatment with suramin was adequate in amount but some of the treatments with hetrazan were decidedly on the low side ; caution should be displayed in interpreting the results after hetrazan until a bigger total dose has been employed.] *F. Hawking*

STEFANOPOULO, G. J. & OVAZZA, M. L'étude expérimentale de la filariose du rat du coton (*Sigmodon hispidus*) à *Litomosoides carinii*. [**Experimental Study of *Litomosoides carinii* Infection in the Cotton Rat.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 498–513, 5 figs. on 2 pls. [73 refs.]

The authors have established a strain of *Litomosoides carinii* in the cotton rat and obtained successful transmission to nine cotton rats with the use of artificial rat nests containing the vector mite *Liponyssus bacoti*. The paper reviews the considerable literature which has developed for this subject during recent years and which has been fully abstracted in this *Bulletin*. A brief description is given of a flagella-like movement of the anterior end of the microfilarial sheath as observed by dark-ground illumination and under the phase contrast microscope. The figures consist of photographs of a microfilaria in a capillary of the lung, of the brain, and of the liver; an adult female of *L. bacoti*; and an adult female of *L. carinii*.

This paper will be a helpful review of the literature on this infection to those unfamiliar with the English language. *D. S. Bertram*

ONABAMIRO, S. D. **A Technique for Studying Infection of *Dracunculus* in Cyclops.** [Correspondence.] *Nature.* 1950, Jan. 7, 31.

Large numbers of *Cyclops* can be examined in bulk for infection with *Dracunculus* larvae by means of the differential chill-coma temperature method. At any temperature between 7·5°C. and 10°C., the *Cyclops* are immobilized, but the contained larvae remain active and can be quickly observed. The viability of *Cyclops* is unimpaired by this method and the risks involved in the use of narcotics are eliminated. *J. J. C. Buckley*

LIE KIAN JOE. **A Case of Gnathostomiasis in Indonesia.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1949, Dec., v. 1, No. 4, 368–70, 2 figs. [11 refs.]

The author briefly reviews the literature of gnathostomiasis [this *Bulletin*, 1949, v. 46, 1069, 1070] and then describes a case in a 26-year-old Chinese in Java.

The patient had a painful swelling on the right side which, over a period of six months, moved over to the level of the left kidney and became more painful. Because of the pain, he broke open the swelling and a worm emerged. It was about 6 mm. in length and the greatest breadth was 1·1 mm. A full description of the worm is given and illustrated by two photographs. It was identified as an immature *Gnathostoma spinigerum* and probably a male.

The developmental cycle of the worm and the epidemiology of gnathostomiasis are briefly discussed. *H. J. O'D. Burke-Gaffney*

DINNIK, J. & DINNIK, N. Struktur und Ursprung der Eischale bei Nematoden der Unterordnung Trichocephalata. [**Structure and Development of the Egg Shell in Nematodes of the Sub-Order Trichocephalata.**] *Ztschr. f. Parasitenk.* 1949, Dec. 31, v. 14, No. 4, 364–76, 12 figs.

HOEKENGA, M. T. & BOX, Louise. **The Treatment of Trichocephaliasis with Leche de Higuerón.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 967–71. [17 refs.]

"1. Fresh leche de higuerón, collected and administered to patients under what was considered to be ideal conditions, removed approximately 60 per cent. of *Trichocephalus* eggs.

"2. This drug caused minor gastro-intestinal symptoms in approximately 50 per cent. of patients."

HITCHCOCK, Dorothy J. *Enterobius* **Study on 320 Children in the General Population of East Lansing, Michigan.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 959–65. [13 refs.]

"1. In the examination of 320 children, ages 1 to 12 inclusive, in private homes in East Lansing, Michigan, using 5·6 Jacob's perianal swabs per child, 33·8 per cent were found to be infected with *Enterobius vermicularis*.

"2. The children in school age group were more often infected than the pre-school groups.

"3. There was no significant difference in the rate of infection of male and female children.

"4. Children in families of 2 to 4 children were more frequently infected than children in families of one child.

"5. Statistically there is no significant difference in the rates of infections of children from families in different income groups.

"6. The number of infected children diagnosed increased with the number of perianal swabs examined up to seven."

HARANT, H. & CARON, M. Nouvel emploi du vieil ail dans le traitement de l'oxyurose. [**A New Method of using Garlic in the Treatment of Enterobiasis.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 461–3.

The use of garlic by the mouth, though long recognized as having an anthelmintic effect, has disadvantages. The authors sought a formula in which garlic could be introduced in suppositories sufficiently diffusible to achieve the necessary local therapy, together with the general therapeutic effect of impregnating the upper parts of the intestine with the active principle of the oil.

After initial trials with tincture of garlic they prepared an ethereal extract, obtaining 64·8 gm. of extract per 500 gm. of the fresh plant.

The suppositories consisted of :—

Ethereal extract of garlic	0·1 gm.
Tincture of eucalyptus	10 drops
Cocoa butter, q.s. for a suppository of 2 gm.	

This formula was used for children of four to ten years : for adults the amount of garlic was 0·25 gm. and the tincture of eucalyptus 20 drops.

One suppository is used daily for five days and the course repeated in three weeks. Such treatment is said to produce very satisfactory results, with disappearance of pruritus and with no irritation of the rectal mucous membrane [but no cases are quoted]. *H. J. O'D. Burke-Gaffney*

GRAEVE, K. & HERRNRING, G. Über die Anwendung der Gamma-Isomere des Hexachlorcylohexan als Anthelminthicum. [**Benzene Hexachloride as an Anthelmintic.**] *Klin. Woch.* 1949, May 1, v. 27, Nos. 17/18, 318.

In view of the toxicity of the gamma-isomer of benzene hexachloride for insects the authors wondered whether it might not prove useful as an anthelmintic, especially for enterobiasis, the treatment of which has hitherto proved so uncertain. Preliminary experiments were undertaken to test the toxicity of the compound. First, groups of 20 mice were given single doses ranging from 0·05 gm. per kilo body-weight to 0·15 gm. kgm. Next, rats were fed for a fortnight with daily doses of 0·035 gm./kgm. and then killed and examined. The slight changes found—glomerulo-nephritis and small focal necroses—were no more than might be seen at times in "normal" animals, at all events in such as had not had the drug. A third experiment was directed to determine the excretion of the drug in the stools ; this was carried out on

dogs which were given single doses of 0·07 gm./kgm. and it was found that some 80 per cent. was excreted. Lastly, the action was tested on adding graded amounts ranging from 0·0005 gm. to 0·0025 gm. to 500 cc. of Ringer's solution in which were specimens of horse ascaris. In the lowest concentration the worms were killed in 3 hours 35 minutes, and with 0·001 gm. upwards in 2 hours. Controls were still lively after 3 hours.

Animal experiments with *Enterobius* have not yet been performed " owing to technical difficulties " but in a personal test a daily dose of 90 mgm. (in three doses of 30 mgm.) produced no toxic symptoms, subjective or objective. In man, it is suggested that it should be prescribed with a saline purgative ; it is hoped to publish results of this later. *H. Harold Scott*

BREDE, H. D. Vermexan, ein Gamma-Hexachlorcyclohexanpräparat als Anthelminticum. [**A Benzene Hexachloride Product—Vermexan—as Anthelmintic.**] *Klin Woch.* 1949, Nov. 15, v. 27, Nos. 43/44, 755.

The author refers to GRAEVE and HERRNRING (above) and others who have tried the action of Gammexane on *Ascaris megalocephala*, *Tubifex*, *Lumbricus herculeus* and *L. rubellus*, *in vitro* and then speaks of Vermexan which contains 70–80 per cent. Gammexane finely divided and is put up in tablets each containing 25 mgm.

The author took, on three successive days, altogether 72 tablets or 21·6 gm. Vermexan, equivalent to 1·8 gm. Gammexane or 12 times the amount usually given therapeutically. No ill-effects followed and the blood and urine examinations showed no deviations from the normal.

He then tried Vermexan in patients infected with *Enterobius*, giving to adults two tablets each day for three successive days (to children under ten years one tablet), then again after a three-day interval till 24 tablets had been taken—a course of 21 days. Examinations by Cellophane strips were made from the 3rd to the 90th days ; the diet had remained unchanged. One hundred and forty-eight were so treated (88 adults between 20 and 72 years, and 60 children between 3 and 12 years) ; 145 were free of infection by the end of the first course ; two others cleared up after a second course, the other remained positive after a third course. Oviposition soon ceased ; in 122 of the patients no ova were seen after the 12th day of the treatment ; in 23 more none after the 21st day ; 27 remained free when they were examined again on the 90th day ; the others were not seen after the 70th day and they were then not passing ova. [If these results are confirmed, it would seem that at last a reliable cure for enterobiasis has been found.] *H. Harold Scott*

ROTH, H. **Trichinosis in Arctic Animals.** [Correspondence.] *Nature.* 1949, May 21, 805–6.

This paper is reviewed in *Bulletin of Hygiene*, 1949, v. 24, 759.

SOUTHAM, C. M., THOMSON, A. E. & BURCHENAL, J. H. **False Positive Trichina Precipitin Reactions in Neoplastic Disease.** *Proc. Soc. Exper. Biol. & Med.* 1949, Nov., v. 72, No. 2, 354–7.

" Patients with certain neoplastic diseases involving the reticuloendothelial system (Hodgkin's disease, lymphosarcoma and acute leukemia) exhibited a high percentage of false positive trichina precipitin reactions. Such reactions were much less frequently encountered in sera from patients with metastatic carcinomas and no positive reactions were observed in the normal controls. The false-positive reaction does not appear to be related to medication."

DEFICIENCY DISEASES

CORKILL, N. L. **A Scorbutic Diet in a Nile Cataract Community.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 293–302, 6 figs. on 1 pl.

A dietary and clinical survey was carried out upon villagers in the Batn el Hagar area of the Sudan. This is an arid area where animal food is only consumed to a very small extent.

The staple was millet, *Sorghum caudatum*; many vegetable foods, onions, chillies, hibiscus and the leaves of the bean *Dolichos lablab* were eaten in fair quantities, but were always cooked for at least an hour from the cold. Tobacco, also a cash crop, played a part in nutrition for it was chewed, mixed with natron, several times a day by young and old of both sexes, and considerable amounts of minerals are derived from the natron.

The diets of eight families were weighed and the nutrient value of the diet evaluated. Compared with estimated requirements the diet was considered deficient in calories, calcium and ascorbic acid, and to some extent in riboflavin.

Clinical examination of the villagers showed that scurvy was common, caries almost universal and there were some slight manifestations probably referable to riboflavin and vitamin A deficiency. There was a marked seasonal variation in the incidence of scurvy.

It is concluded that, as the resources of the area are small, resettlement of the population is indicated, but that as a palliature measure useful foods could be introduced by the planting of the jujube tree, *Zizyphus spina-christi*, the gingerbread-nut palm, *Hyphaene thebaica*, the desert date, *Balanites aegyptiaca*, and the mesquite or honey locust, *Prosopis juliflora*. *Dean A. Smith*

VAN STEENIS, P. B. Kwashiorkor, een voedingsdeficiëntieziekte. [**Kwashiorkor, a Nutritional Deficiency Disease.**] *Nederl. Tijdschr. v. Geneesk.* 1949, Nov. 5, v. 93 (iv), No. 45, 3794–801.

A case is described of a merchant seaman who, after 15 years at sea, in 1944 developed abdominal pain and diarrhoea. He was treated on more than one occasion for tropical sprue without result, also with emetine as amoebae were found in his stools. In 1946 he developed generalized oedema with thrombosis.

He was first seen in 1947 when he was having frequent, pale, formed stools without abdominal pain and complained of weariness and muscular weakness. He was pallid, with generalized oedema, dry scaly skin and thin, dull brittle hair which had lost much of its colour. The liver was enlarged and firm. No other abnormality was discovered on physical examination except a zone of hyperaesthesia on the left side of the vertebral column at the level of the seventh thoracic segment.

Exhaustive pathological investigation revealed an excess of neutral fat in the stool, with no split fat, and considerable steatorrhoea with much unaltered muscle fibre. There was slight anaemia (colour index 1·07), and a low serum protein, the serum albumin being only 2·1 gm. per cent.

After many different dietary and hormone treatments had been given, with some subjective but little objective improvement, choline chloride was tried; the result was dramatic. The liver became smaller and at the same time mild signs of portal obstruction developed; oedema diminished markedly and the patient's well-being and muscular power improved steadily. He is now on full work and has only a little oedema of the legs at the site of an old cellulitis.

On the basis of the excess of neutral fat and the undigested muscle fibres in the stool a pancreatic deficiency is suggested, leading to fatty degeneration and cirrhosis of the liver. On this basis a diagnosis of kwashiorkor is considered

justifiable. The disease is thought to have arisen from the patient's abnormal eating habits and distaste for food when serving meals on a troopship. His oedema is thought to have been due to faulty formation of serum albumin by his diseased liver, his muscular weakness to lack of amino-acids due to non-digestion of meat proteins.

The author discusses fully the distribution, aetiology and pathology of kwashiorkor, together with its relation to sprue and steatorrhoea. [Many authors are quoted but few references given.] *A. L. Winner*

NICHOLLS, L. **The Bearing of Recent Research on Rice Milling.** Reprinted from *Brit. Sci. News.* [1948], v. 2, No. 22, 306–9, 6 figs.

——. **Rice and its Nutritional Aspects.** Reprinted from *Research.* 1949, v. 2, 401–7, 5 figs. [12 refs.]

Rice is the staple cereal used by a large proportion of the population of South-East Asia, and the amount grown annually, about 140 million tons, is greater than that of any other grain crop except wheat. Malnutrition is widespread among the rice-eating peoples, and it is of the utmost importance at the present time that rice production should be increased to its maximum, and that rice should be so processed and handled that it retains its full nutritive value.

Properly handled, rice is a satisfactory staple ; its protein content is about 8 per cent., its amino-acid pattern satisfactory, and its content of B vitamins more than adequate to balance the calorie value of its starch.

The B vitamins, however, are mainly found in the embryo and outer coats of the grain, and a high proportion of them is lost in the milling and pearling processes employed in South-East Asia. Moreover, in many of the mills, now old and worn, the grains are broken and pulverized. This leads to the undesirable necessity of excessive washing before cooking, with consequent further loss of vitamins.

The problem of retaining a high proportion of vitamins in a milled product can be solved by the process of parboiling. In parboiling, paddy is soaked for three or four days and then steamed in small tanks. After drying in the sun it can be milled. During the parboiling process there is migration of the B vitamins from the embryo and outer layers to the endosperm, so that far smaller proportions of these factors are lost on subsequent milling. Moreover parboiling causes some gelatinization and toughening of the grains so that there is less breaking and pulverization during the milling process.

Increased production of rice could be achieved by opening up new areas for cultivation, and by farming already cultivated land more efficiently, possibly by mechanized means. The necessary pre-requisites of either form of development are the certainty of a fair, high price for rice, to induce peasants to cultivate paddy instead of cash crops, and the breaking of the prevalent vicious circle of malnutrition leading to lethargy and decreased production, the decreased production in its turn leading to malnutrition. *Dean A. Smith*

DANARAJ, T. J. **The Cerebellar Aspect of Nutritional Spinal Ataxia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 343–4, 2 figs. on 1 pl.

A case is reported of nutritional spinal ataxia associated with the skin and muco-cutaneous manifestations of B complex deficiency. There was no weakness. Sensory changes were slight and quite insufficient to account for the gross ataxia. On a liberal diet with supplementary milk and eggs, and a course of

nicotinic acid and riboflavin, recovery was rapid, and it is evident that in this case of nutritional neuropathy the spino-cerebellar tracts were considerably more affected than were the posterior or pyramidal tracts or the peripheral nerves. *Dean A. Smith*

DIACOS, C. Les altérations oculaires dans la pellagre. [**Ocular Changes in Pellagra.**] *Ann. d'Oculistique.* 1949, Apr., v. 182, No. 4, 279–94, 6 figs. [56 refs.]

Famine was widespread during the occupation of Greece. The first clinical manifestation was oedema ; pellagra assumed epidemic proportions in 1942. Pellagra is here regarded as a multiple deficiency of B_2 complex ; most cases were acute and recovery was generally fairly rapid.

Few pellagrins complained of eye troubles. The present study is based on 41 cases.

Lesions of the conjunctiva, cornea and lens were seen.

The conjunctiva.—The palpebral conjunctiva was seldom affected. The bulbar conjunctiva was oedematous and showed linear erosions on the temporal side of the palpebral aperture. There was usually intense vaso-dilatation, proportional in severity to that of the adjacent skin lesions on the face.

The cornea.—Corneal dystrophy was seen in a number of cases. There were two types, superficial and interstitial. In the superficial type minute, multiple, superficial lesions or erosions were visible with the slit lamp, mainly concentrated in the lower half of the cornea. They readily took up fluorescine. The interstitial lesions, seen in a quarter of all cases, consisted of four to six ovoid opacities lying deeply in the corneal stroma. They were placed semi-circularly in the lower half of the cornea with the concavity of the semicircle upwards. The interstitial lesions disappeared more slowly upon treatment than did the superficial lesions. Corneal vascularization was frequently seen, but was regarded as entirely non-specific.

The lens.—Opacities in the lens were of three types :—

(1) minute powder-like opacities distributed evenly over the anterior and posterior surfaces of the lens ;
(2) multiple irregular opacities mainly seen round the periphery, and possibly formed by the confluence of the powder-like opacities ;
(3) tongue-like opacities extending from the peripheral zone towards the centre of the lens.

No other of the ocular lesions which have been associated with vitamin B_2 deficiency were seen. No abnormalities were discovered in vision, visual field, nor in the fundus ; nor was there any evidence of degeneration of the optic nerve or of retro-bulbar neuritis. It is concluded that the lesions described are associated with acute avitaminosis B_2, whereas those of the retina and optic nerve only occur in prolonged deficiency. *Dean A. Smith*

MAINZER, F. **Insulin-Hypersensitivity in Pellagrins and its Significance.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 329–42, 4 figs. [82 refs.]

It has been observed previously that pellagrins exhibit hypersensitivity to insulin. In the present series of 99 blood sugar investigations upon 33 pellagrins, a fall in fasting blood sugar level after small doses of insulin (5 units subcutaneously) regularly exceeded, by a considerable margin, that observed in normal subjects and sometimes reached levels as low as 10 to 20 mgm. per cent. In the majority of cases the return of the blood sugar to the initial level was

delayed and incomplete. In a number of cases severe cerebral hypoglycaemic phenomena occurred unheralded by autonomic manifestations, except for tachycardia.

This phenomenon persisted throughout treatment of the cases, and was still present after they were apparently completely cured.

The author discusses the possible mechanisms of this insulin hypersensitivity, particularly in relation to function of adrenal cortex and liver, both of which organs are concerned in the regulation of carbohydrate metabolism and show severe anatomical damage in many pellagrins, the liver damage being produced by deficiencies of cholin and high-value protein, and the adrenal damage by pantothenic acid deficiency. No definite conclusions are reached as a result of the present observations, but a hopeful line of animal experiment is suggested.

Dean A. Smith

SPRUE

GARCIA LOPEZ, G., MILANES, F., SPIES, T. D., LOPEZ TOCA, R., ARAMBURU, T. & LOPEZ, H. **The Association of Hypoproteinemia with Severe Tropical Sprue.** *Amer. J. Med. Sci.* 1949, Dec., v. 218, No. 6, 660–68, 7 figs.

Of 155 patients with tropical sprue, 121 were selected for study of their plasma proteins because they had either clinical oedema or a dietary history suggesting a low protein intake. The work was carried out at the General Calixto Garcia Hospital, University of Havana, Cuba.

Eighty of these patients had total plasma protein levels of less than 6·0 gm. per 100 ml.; in most cases the albumin/globulin ratio was not grossly distorted. From the day of their admission and throughout the study their diet was restricted to bread, cereals, root vegetables, fruit, sugar and coffee. All except one patient received folic acid, 10 to 100 mgm. by mouth daily for 10 to 160 days.

Reticulocytosis, with rise of red cell count and haemoglobin level, occurred in all cases, but in 20 there was significant increase of oedema with fall of plasma protein at the peak of the haemopoietic response. Many of these patients showed improvement in strength and vigour coincident with their regeneration of red cells and haemoglobin, but their plasma protein levels and oedema only returned to normal when milk, meat and eggs were later added to the diet. It is strongly recommended that diets high in good quality protein, in addition to the specific anti-anaemic therapy, are necessary for full rehabilitation.

Dean A. Smith

GILROY, J. C. **The Rôle of Fat ingested in the Diet in the Incidence of Sprue.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1949, Nov., v. 43, No. 3, 303–10. [21 refs.]

The incidence of sprue among British troops in the Far East during the last war was very high. For instance, out of 8,000 men invalided home for medical [as opposed to surgical] reasons during 1944–45 there were 1,000 cases of sprue. In striking contrast is the fact that sprue was virtually absent among prisoners of war in Japanese hands, nor did these prisoners develop sprue when they were repatriated.

The present concept of sprue is that it is a conditioned deficiency of vitamin B2 complex arising from intestinal changes, in which infection may be an important predisposing factor. It has been postulated that the deficiency

phase may be precipitated by a change in the intestinal media disturbing the balance between biosynthesis and destruction of B2 complex vitamins in the intestine.

The main difference in environment between the troops, many of whom developed sprue, and the prisoners who did not, was dietary, and particularly related to the fat content of the diet. It is suggested that the presence of significant amounts of fat in the diet with inability to absorb it, leaving unabsorbed fatty acids in the intestine, may be a determining factor in the onset of the deficiency stage, and that the disease will not enter this stage if the diet contains no fat. *Dean A. Smith*

SUAREZ, R. M., SPIES, T. D., HERNANDEZ-MORALES, F. & PEREZ, E., with the technical assistance of Clemencia BENITEZ-GAUTIER. **A Note on the Effectiveness of Vitamin B_{12} in the Treatment of Tropical Sprue in Relapse.** *Blood.* Baltimore. 1949, Oct., v. 4, No. 10, 1124–30, 3 figs. [14 refs.]

"Three cases of tropical sprue were treated with repeated injections of vitamin B_{12} and showed dramatic and sustained therapeutic responses."

HAEMATOLOGY

ROBERTS, J. I. **Biological Studies on Kenya School Children.** *J. Trop. Med. & Hyg.* 1949, Nov., v. 52, No. 11, 225–37, 4 figs.

Investigations were made on the blood and faeces of 665 European and 474 African school children, living in Nairobi at an altitude of about 5,500 feet. The haemoglobin values (Hellige) rose in European males from 84 per cent. at the age of 6 years to 108 per cent. at the age of 18; in females the peak (of 100) was reached at 14. The African figures were about the same. The total red blood cells showed much the same ranges from about 4½ to 5½ millions per cmm. and about half a million lower in Africans. The white blood count showed the well-known low polymorphonuclear count as compared with the high lymphocyte—a reduction from normal of between 15 and 25 per cent. in the former. A quarter of the European boys and a half of all the African children of both sexes had an eosinophilia of 6 per cent. or over. Intestinal infections (*e.g.*, *S. mansoni*, *Ancylostoma*, *Taenia*, *Giardia*, etc.) were common in these same groups, but were not particularly related to the presence of eosinophilia.

The paper contains a long dissertation on the relation of the above findings to alleged mental and physical defects in European children living at high altitudes in the tropics. *P. C. C. Garnham*

SWITZER, P. K. **The Incidence of the Sickle Cell Trait in Negroes from the Sea Island Area of South Carolina.** *Southern Med. J.* 1950, Jan., v. 43, No. 1, 48–9, 1 fig. [20 refs.]

"(1) Sickle cell disease was found in 12·86 per cent. of 1,453 Negro males examined.

"(2) Sickle cell disease was found in 13·9 per cent. of 1,613 females examined.

"(3) Sickle cell disease was found in 13·43 per cent. of 3,066 colored persons examined.

"(4) An unusually high incidence was found in the ages from 6 to 10 years, 20·7 per cent. in males and 18·2 per cent. in females."

BETTENCOURT-GOMES, S. C. **A Note on Sickle-Cell Anaemia.** *Brit. Guiana Med. Ann. 1947.* 28–32.

" Five cases of sickle-cell anaemia are briefly described.

" It is surmised that sicklaemia with and without anaemia must be comparatively common in British Guiana in view of the strong Negro strain in the population, and a suggestion is made that blood tests of school children would be the best means of determining this.

" When a case of anaemia is resistant to the usual treatment, the test for sickling of red blood cells should be done. Neither liver nor iron probably has any effect on sickle-cell anaemia and the only effective measure during a severe haemolytic crisis is repeated blood transfusion."

VENOMS AND ANTIVENENES

KÖIVASTIK, T. Neutralisationsfähigkeit der Schlangengift-Antitoxine gegen homologe und heterologe Gifte. [**Capacity of Snake Venom Antitoxin to neutralize Homologous and Heterologous Venoms.**] *Ztschr. f. Hyg. u. Infektionskr.* 1949, May 24, v. 129, Nos. 3/4, 373–8.

The author has briefly summarized the literature on the specificity of antibody production against various snake venoms. He gives details of experiments in which the killing effects of the venoms of *Vipera berus berus*, *Vipera aspis* and *Vipera ammodytes* after intravenous injection into white mice are compared in the presence of homologous and heterologous antisera. His results and those of other workers tabulated in the paper indicate that viperine antisera are strongly specific against homologous poisons and act weakly and irregularly against heterologous viperine poisons. He concludes that for practical purposes in the therapy of snake bite antisera specific for the injected venom are necessary. A wide survey of the antigenic properties of snake venoms from geographically distinct localities is indicated. *B. G. Maegraith*

DERMATOLOGY AND FUNGUS DISEASES

PUJATTI, D. Dermatite vescicobollosa stagionale da *Paederus melampus* Er. (Coleoptera-Staphylinidae) nel sud India. [**Seasonal Vesicular Dermatitis caused by *P. melampus* in South India.**] *Mem. Soc. ent. ital.* Genoa. 1947, v. 26, 5–11, 2 figs. [32 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1949, Dec., v. 37, Pt. 12, 233.]

The author gives a list of species of *Paederus* recorded as causing vesicular dermatitis in man, and states that during a period of service of nearly two years (May 1941 to December 1942) in a prisoner-of-war hospital and adjacent camps near Bangalore, he observed 42 cases due to contact with *P. melampus*, Erichs., which has not previously been reported to cause dermatitis. The adults, which are described, leave their preferred habitats near water during the rains and can then be found in houses, barracks and tents ; they are attracted to light. Most cases occurred in May–July. The symptoms are described.

SIMONS, R. D. G. P. **Additional Studies on Psoriasis in the Tropics and in Starvation Camps.** Reprinted from *J. Investigative Dermat.* 1949, May, v. 12, No. 5, 285–94. [15 refs.]

Psoriasis occurs in the natives of tropical countries but to a less extent than in Europe, 1·5 cases per thousand being seen in Java as against 47·3 per thousand in Holland.

Residence in the tropics has an inconstant and unpredictable effect on the course of the disease in Europeans, some improving, others getting worse. Among patients imprisoned in Japanese camps, under conditions of prolonged undernutrition, psoriasis diminished in severity in the majority, but not in all. No dietary factor could be discovered. *Dean A. Smith*

MARSIAJ, N., GUIMARÃES, N., CUNHA, J. P. & LIMA, A. O. Investigações preliminares sôbre a incidência de sensibilidade cutânea à histoplasmina no Brasil. [**Preliminary Investigation on the Incidence of Cutaneous Sensitivity to Histoplasmin in Brazil.**] *Hospital.* Rio de Janeiro. 1949, Aug., v. 36, No. 2, 273–7. [22 refs.]

Impressed by the results of the histoplasmin skin test on groups of healthy persons in various parts of the United States and Canada [which have been noted regularly in this *Bulletin*] the authors applied the test to 495 healthy persons, aged from 2 to 80 years old, of both sexes, belonging to various occupations and social grades, in three areas of Brazil. The histoplasmin was prepared by one of the authors and it was used according to the procedure approved in the United States. Apparently, however, the dilution employed was 1 : 100 instead of the more usual 1 : 1,000.

The results were as follows: In the district of Rio Grande do Sul, out of 200 persons tested, 14 (7 per cent.) were histoplasmin positive. In Bahia, 11 out of 119 tested (9·24 per cent.) were positive and in the Federal District 22 out of 176 (12·5 per cent.) were positive. An analysis of the ages of reactors shows that in Rio Grande do Sul there were none below the age of 20 or over the age of 59, and the maximum incidence occurred between the ages 20 and 29. In Bahia reactors were found in age groups from 10 to 49 years with the highest incidence between 10 and 19. In the Federal District reactors occurred in age groups from 10 to 69 with the maximum incidence between 40 and 60. Of the total of 495 subjects, 311 were males and 37 (11·89 per cent.) of these were reactors; 184 were females and 10 (5·43 per cent.) were reactors. It was difficult to base definite conclusions on the results as it was felt that histoplasmin used at 1 : 100 might give reactions with persons who had suffered from other fungus diseases such as Brazilian blastomycosis. It is proposed therefore to repeat the experiment with histoplasmin used in two dilutions, 1 : 100 and 1 : 1,000. *J. T. Duncan*

PRIOR, J. A., COLE, C. R. & TORBET, Virginia. **An Evaluation of the Histoplasmin Reaction in the Detection of naturally occurring Histoplasmosis in Dogs.** *Pub. Health Rep.* Wash. 1949, Dec. 2, v. 64, No. 48, 1562–6. [14 refs.]

"1. 837 dogs were tested with histoplasmin and only 5 reacted (0·59 per cent).

"2. Of five dogs reacting to histoplasmin, three were proved to have active naturally occurring histoplasmosis. All failed to react to tuberculin. Attempts to demonstrate pathogenic agents other than *H. capsulatum* were unsuccessful.

" 3. It appears that the histoplasmin skin test is more useful in the detection of naturally occurring active histoplasmosis in dogs than it is in other species.

" 4. One dog, terminally ill with acute histoplasmosis, diagnosed by blood culture and confirmed at autopsy by recovery of a pure culture of *H. capsulatum* from liver, spleen, lymph nodes, lung and ascitic fluid, failed to react to histoplasmin on two occasions."

NORMAN, I. L. & LAWLER, A. L. **Coccidioidomycosis. Review of the Literature and Report of Nine Cases.** *U.S. Nav. Med. Bull.* 1949, Nov.–Dec., v. 49, No. 6, 1005–20, 9 figs. [14 refs.]

After a brief review of the history and clinical features of coccidioidomycosis, now familiar to most readers, the authors record nine new cases of the disease, two of which were fatal. The other seven were cases of the primary pulmonary stage of the disease only and all of these patients made good recoveries. The chief point of interest in the seven non-fatal cases lay in the possibility of the radiological findings being misinterpreted. For example, the X-ray picture in Case 2 suggested lung tumour, in Case 3 unresolved pneumonia, in Case 4 active pulmonary tuberculosis, in Case 6 lung tumour and in Case 8 metastatic sarcoma of the lungs. The only feature of interest in cases 5 and 7 was the occurrence of erythema nodosum which, in Case 7, a white woman aged 49, was associated with only " very minimal " pulmonary disease.

In the two fatal cases, 1 and 9, there was intracranial disease. The first of these patients was a young negro, a race notoriously susceptible to the disseminated granulomatous form of the disease, who had an extradural abscess over the vertex of the brain and many abscesses on the pia-arachnoid over the entire surface of the brain. He had also involvement of the skin, lungs, spleen, lymph nodes, ribs and sternum. The other patient, a 56-year-old white male, who had suffered previously from pulmonary tuberculosis which may have rendered him susceptible to dissemination of the coccidioidal infection, had multiple abscesses of the brain substance and hydrocephalus. *J. T. Duncan*

GINÉS, A. R., GOULD, E. & MELGAREJO DE TALAVERA, S. Intradermorreacción con coccidioidina. Contribución al estudio de la coccidioidomicosis en el Paraguay. [**Intradermal Reaction with Coccidioidin. Contribution to the Study of Coccidioidomycosis in Paraguay.**] *Hoja Tisiológica.* Montevideo. 1949, Sept., v. 9, No. 3, 255–60.

The epidemiological value of the coccidioidin skin-sensitivity test, sometimes supplemented by radiological examination of the chest, has been proved abundantly in the United States since 1937 and more recently by NEGRONI and his associates in Argentina [this *Bulletin*, 1949, v. 46, 1173].

The present authors carried out a survey by means of the coccidioidin test and radiography on 2,474 people of ages ranging from 2 to 70 years, in Asunción (Paraguay). The coccidioidin was supplied by Stanford University, California and it was used at a dilution of 1 : 1,000 on a group of 1,591 people and at 1 : 100 on all other groups. The results of the test were classified as negative when there was no reaction or only a simple macule less than 2 mm. in diameter ; doubtful when a macule or papule of 2 to 4 mm. resulted, and positive if the macule or papule attained a diameter of 5 mm. or more. The positives were graded as + when the diameter of induration was from 5 to 9 mm. ; ++ from 10 mm. to 19 mm. and +++ if the diameter exceeded 19 mm. or vesiculation occurred.

In a group of 1,591 healthy people tested with the 1 : 1,000 dilution of coccidioidin, 0·25 per cent. gave doubtful reactions, 2 per cent. positive + and 0·06 per cent. positive ++. The largest reaction measured 10 mm. Calcification (site not stated) was present in 5·4 per cent., adenopathy in 0·63 per cent. and pulmonary lesions in 1·73 per cent. In view of the low total of positive results (2·06 per cent.), the strength of coccidioidin was raised to 1 : 100 for the remaining tests.

A second group of 356 healthy people [351 in the text], similar to the first group, yielded 0·56 per cent. doubtful reactors, 0·52 per cent. positive + and 0·28 per cent. positive ++, and the largest reaction measured 13 mm. It will be noticed that the proportion of reactors was lower with the 1 : 100 than with the 1 : 1,000 dilution of coccidioidin.

A group of 70 persons suffering from American dermal leishmaniasis was tested and 4·0 per cent. gave reactions of 5 mm. Calcifications were present in 17 per cent., adenopathy in 4·2 per cent. and pulmonary lesions in 1·04 per cent.

Finally, 106 subjects of pulmonary tuberculosis were tested and yielded only one reactor.

Control injections were apparently not made, but it is stated that injections of physiological saline on persons not included in the present survey gave dermal reactions in similar proportions.

It is difficult to draw conclusions from the results stated, but the authors are satisfied that the existence of indigenous coccidioidomycosis in Asunción has not been proved. *J. T. Duncan*

HAUPT, E. Über das klinische Bild einer Infektion mit dem Oomyceten Coccidioides immitis. [**Clinical Features of an Infection by** *Coccidioides immitis*.] *Klin. Woch.* 1949, Sept. 1, v. 27, Nos. 33/34, 570–71.

A case in a prisoner of war who had been in Texas. [In this paper the name is incorrectly spelt throughout as "*Coccidoides*."]

MILLER, D. & BIRSNER, J. W. **Coccidioidal Granuloma of Bone.** *Amer. J. Roentgenol. & Radium Therapy.* 1949, Aug., v. 62, No. 2, 229–36, 13 figs.

Involvement of the bony tissue is not infrequent in the disseminated stage of coccidioidomycosis, and the present paper deals with a series of 17 cases, which were studied radiologically. The bones involved were the skull, sternum rib, clavicle, radius, metacarpal, ilium, femur, patella, tibia, fibula, tarsal, metatarsal and the vertebrae. The bones most frequently affected were the vertebrae, especially in the lumbar region, and the bones of the lower extremity were more frequently affected than those of the upper extremity. The special features of the 17 cases are set out in tabular form and brief descriptions are given of 4 of the cases.

Radiology showed that the lesions of the bones were chiefly osteolytic, although there was occasionally some sclerosis and, in a few cases, linear calcification in the soft tissues adjacent to the affected bones. When the bones and the soft tissues overlying them are both involved in the disease it is difficult to determine which was primarily affected. The present authors consider that the infection of the bones is haematogenous and involvement of the neighbouring soft tissues, with abscess-formation and ulceration, is due to extension from the bone lesions. They disagree with those authors who believe that disease of the bones is secondary to that of the overlying soft parts, and they state that in none of their 17 cases did an abscess in the soft tissues give rise to disease of the underlying bone.

The ages of the 17 patients ranged from 9 years to 69 years but the majority were between 20 and 40 years. The disseminated form of the disease is found much more frequently in coloured than in white races, and only 3 of the 17 patients were white ; the remainder being Negro, Chinese and Filipino. The duration of the coccidioidal disease before lesions of the bones became apparent ranged from 30 days in one case to 16 years in another.

The coccidioidin skin test is of little diagnostic value in the disseminated stage of the disease and only 7 out of 14 patients tested gave the reaction. On the other hand, serological reactions are usually positive in the advanced disease and all of 11 cases tested gave positive results. *J. T. Duncan*

MELICK, D. W. **Surgical Treatment of Pulmonary Coccidioidomycosis (Local Excision of Small Lesions).** *Arizona Med.* 1949, Apr., v. 6, No. 4, 24–5.

" Pulmonary resection is a useful operation in certain lesions resulting from coccidioidomycosis. A local excision of small lesions located peripherally can be carried out with removal of a minimal amount of pulmonary tissue.

" Coccidioidin skin tests should be scrutinized quite closely. A negative coccidioidin skin test should only be valid when the higher concentrations of the coccidioidin have been used."

DE AZEVEDO, A. P. Lesões do sistema nervoso central na doença de Lutz (Blastomicose brasileira). [**Lesions of the Central Nervous System in Lutz' Disease (Brazilian Blastomycosis).**] *Hospital.* Rio de Janeiro. 1949, Oct., v. 36, No. 4, 465–87, 14 figs. English summary.

Although intracranial involvement is present in about 30 per cent. of fatal cases of coccidioidal granuloma, there are very few references in the literature to intracranial lesions in paracoccidioidal granuloma (Brazilian blastomycosis)

In a series of 11 autopsies on cases of generalized Brazilian blastomycosis, the author found three cases, between the years 1928 and 1931, showing intracranial disease and two of these were the first cases to be reported in which the brain tissue was involved. Detailed clinical and pathological descriptions of the three cases are given but it is only necessary to refer to those relating to the intracranial lesions. In the first case the lesions consisted of two adjacent, very prominent nodules of a yellowish colour superficially situated on the left temporo-sphenoidal lobe. They were of firm consistency, sharply demarcated and about the size of a hazel nut. The overlying pia-arachnoid was thickened but elsewhere this membrane appeared to be normal and the cerebrospinal fluid was clear although under increased pressure. Other nodules were found on the left side of the cerebellum and on the right occipital lobe ; the surface of the last was in process of breaking down. The nodule consisted of a granuloma of histiocytes, giant cells, plasma cells, lymphocytes and very numerous polymorphonuclears, and the central area was necrotic. The parasite, *Paracoccidioides brasiliensis* was found in the necrotic matter, and throughout the granuloma but especially in the giant cells. The surrounding brain substance was hyperaemic and oedematous and showed a polymorphonuclear and glial reaction. In the second case the lesions were of a similar kind but smaller, ranging in diameter from 3 mm. to 12 mm., and more numerous, being widely distributed on the surface of the brain. The pia-arachnoid, over the vertex, was also involved and the cerebrospinal fluid was turbid and under increased pressure. There was no lesion of the cranial bones or the dura mater in these two cases, but in the third case the intracranial

disease was due to extension from ulcerating granulomata on the scalp which caused necrosis and perforation of the cranial bones with associated subdural abscesses. In this case there was no involvement of the brain tissue.

J. T. Duncan

HEAT STROKE AND ALLIED CONDITIONS

KOCH, W. & KAPLAN, Deborah. **Air Movement under Mosquito- and Sandfly-Nettings.** *Ann. Trop. Med. & Parasit.* 1949, Apr., v. 43, No. 1, 26–31, 5 figs. on pl. & 2 text figs.

The reduced air movement within a mosquito-net compared with the movement in the room outside the net enhances the discomfort experienced in hot sleeping quarters where nets must be used. The authors report a study of the reduction of air movement due to various kinds of netting.

The top surface of the netting under test was suspended by a hook attached to the ceiling fan, and the open side secured to the edges of a laboratory table. Repeated measurements of the air speed were made at about 30 cm. above the centre of the table, under the net. Then the net was removed, and further measurements of the speed of the unobstructed air were made in the same position. The free air speeds ranged from 0·39 to 1·29 metres per second (about 80 to 260 ft. per min.). Since the cooling effect of air movement on the human body varies approximately as the square root of the speed, the obstructing effect of a particular netting was expressed as the ratio of the square root of the speed under the netting to the square root of the speed of the unobstructed current. For three sandfly nets issued by the War Office, these ratios varied between 0·367 and 0·395, and for two mosquito nets they were 0·573 and 0·562. The mosquito nets allowed more air movement beneath them.

One may hope that the authors will continue this research.

Thomas Bedford

TROPICAL ULCER

VINCENT, M. Le procédé de Filatov dans le traitement des ulcères tropicaux. [**Filatov's Procedure in the Treatment of Tropical Ulcer.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3, 369–71.

[The "procedure of Filatov" consists in implanting grafts of living tissue into the cellular tissues of the subject, where it is claimed they break down with the production of substances which have the power of stimulating histiogenesis. Autografts of portions of skin of the abdominal wall may be used, or pieces of liver, placenta, fragments of tissue taken from an amputated limb, or even skin from a corpse preserved in ice, as well as such substances as extracts of aloe leaves. The procedure was introduced in Russia for the treatment of retinitis pigmentosa and other refractory ocular diseases. Good results were reported and it is claimed that the principle is applicable to a wide range of diseases for which no specific treatment exists, such as scleroderma, psoriasis, vascular spasm and asthma.]

This paper reports the use of the method in 25 cases of tropical phagedaenic ulcer of long standing, which had resisted all the usual methods of treatment. A strip of skin, 8×2 cm., was taken from the anterior abdominal wall and immediately inserted into a space prepared by an incision in the upper part of the thigh of the affected side. The ulcer itself was curetted and dressed with 10 per cent. Balsam of Peru. In no case was the graft subsequently extruded,

and in all but two of the cases the ulcer was covered by clean granulations and ready for grafting in 15 to 21 days; 4 cases relapsed and the procedure was repeated, but its beneficial effect was not so great as after the first operation and it seemed that skin grafting would have been preferable.

W. L. Harnett

MISCELLANEOUS DISEASES

RAVINA, A., NORY, J. & AVRIL, J. Episodes pathologiques multiples ayant précédé et suivi l'apparition d'infiltrates pulmonaires éosinophiliques fugaces. Quelques remarques à propos des infiltrats pulmonaires labiles. [**Multiple Pathological Episodes preceding and following the Appearance of Fleeting Eosinophilic Pulmonary Infiltrations. Some Remarks on Labile Pulmonary Infiltrations.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1948, Nos. 36/37, 1215–20.

The authors report, in considerable detail, the case of a young man who had numerous pathological episodes, including repeated attacks of asthma, pleural effusions, transitory cardiac dilatation, a meningeal attack with sterile but very cellular cerebrospinal fluid, and fugitive swellings, sometimes associated with fever. Radiography of the chest from time to time showed fleeting lung infiltrations. The leucocyte count was usually raised and the eosinophil percentage was about 35, although the last two counts showed only 7 per cent. The patient passed an adult *Ascaris* on one occasion.

Discussing this case in particular and fleeting pulmonary infiltrations with eosinophilia in general, the authors conclude that transient eosinophilic infiltrations are almost constantly, if not constantly, associated with migration in the lungs of *Ascaris* larvae which act either by mechanical irritation, by the secretion of toxins, or by some other local process which we do not understand. The meningeal reactions are due either to the migration of larvae, or to intoxication, or to sensitization due to the presence of the worm in the body. The fact that these meningeal incidents occurred, in all the cases reported, just three weeks after the verification of fleeting eosinophilic infiltrations is in favour of cerebro-meningeal migration of larvae.

The prolongation of the pathological states, as in the case that they report, is perhaps associated with comparatively less important, but repeated, infestations.

In order to obtain a better understanding of these pathological states, further clinical studies are required and also investigations to obtain a more precise knowledge of the cycle of *Ascaris* in man and in animals.

L. E. Napier

MORTON, P. H. & JONES, C. C. **Tropical Eosinophilia with Report of a Case treated with Penicillin.** *Ann. Intern. Med.* 1949, Dec., v. 31, No. 6, 1112–18. [18 refs.]

The penicillin was not of value in treatment.

See also p. 387, MALHOTRA, **Filaria and Loeffler's Syndrome.**

GELFAND, M. **Tropical Phlebitis and its relation to Myositis Tropica.** *J. Trop. Med. & Hyg.* 1949, Dec., v. 52, No. 12, 248–51, 3 figs.

The aetiology of tropical myositis remains obscure. There are two forms, one with and one without pus. The author describes a case in which thrombosis

of the superior gluteal vein, with inflammation and oedema of its wall, was associated with acute necrosis of the muscles of the buttock. The patient was an African male aged about 24, who gave a history of only one day before admission to hospital, who was obviously very ill, and who died under general anaesthesia before operation the day after admission. The chief clinical sign was swelling over the buttock and thigh, with diffuse pain.

Post-mortem appearances were those of thrombophlebitis as previously described by the author. The arteries were not affected, but the supposition is that interference with blood supply through venous clotting, and extension of inflammation to the tissues round the vein, were enough to cause acute necrosis of the muscle, though it is not certain that the inflammation did not begin in the muscle and affect the vein secondarily. There was no pus. This may have been an early stage of one form of tropical myositis, and the association of the condition with thrombophlebitis may be commoner than is supposed. *Charles Wilcocks*

PFEFFER, K. H. Doppelseitige Hydronephrose bei einem Fall von Latyrismus. [**Bilateral Hydronephrosis in a Case of Lathyrism.**] *Med. Klin.* 1949, Dec. 9, v. 44, No. 49, 1576–7, 1 fig.

A case in a prisoner of war from Russia.

KANJILAL, G. C. **Diarrhoeas in the Tropics—Etiological Aspect.** *J. Indian Med. Ass.* 1949, Dec., v. 19, No. 3, 88–91.

A general discussion.

GELFAND, M. **Malignancy in the African.** *South African Med. J.* 1949, Dec. 10, v. 23, No. 50, 1010–16. [18 refs.]

Estimates of the frequency of occurrence of malignant tumours in the African may be based on hospital figures, which give a good cross-section of the population, except in the case of hospitals which do not admit women and children, but have the drawback that the diagnosis may not be established conclusively ; alternatively they may be based on autopsy findings or on reports of tissues sent for microscopy. Visceral growths predominate in the former, as the severity of the symptoms necessitates admission of the patients to hospital, skin tumours in the latter, as these patients rarely die in hospital. It is therefore unsafe to draw general conclusions from a series of either kind. The present paper summarizes the findings in 2,000 autopsies on Africans performed at the Salisbury Hospital, Southern Rhodesia, in 1946–48 ; among these were 65 cases of carcinoma, liver, stomach and bladder leading with 19, 11 and 10 cases respectively and 9 cases of sarcoma. There is also an analysis of 334 sections of malignant tumours, mostly of accessible growths, studied in the laboratory ; 228 sections were reported to be carcinoma and 106 sarcoma, including 30 melanomata and one glioma. These findings are compared with those recorded in the literature of the subject, leading to the conclusion that sarcoma is relatively more common in Africans than in Europeans, but is not so frequent as carcinoma. It is generally accepted that primary carcinoma of the liver is the most common visceral tumour in the Bantu, occurring mainly in young males in livers affected by pre-existing cirrhosis. In the author's series it formed 26 per cent. of the malignant tumours found at autopsy and 8 per cent. of those examined in the laboratory. The ten examples of cancer of the bladder were all associated with *Schistosoma* infections, but as this condition is almost universal in the African population of S. Rhodesia, it may be an incidental finding.

Cancer of the stomach was found in 15 per cent. of the 65 autopsies, but in only 1·5 per cent. of the sections. Cancer of the large bowel appears to be uncommon, most of the writers quoted stated that it formed 1–3 per cent. of their series, but one series showed as many as 15 per cent. ; the author had none in the necropsy series and one among the 334 sections. There were three cancers of the pancreas among the sections of tumours, none among the autopsies. No attempt is made to assess the frequency of carcinoma of the female genital tract. Skin epithelioma is fairly common, arising in connexion with chronic ulcers of the leg, there were 81 such in the author's laboratory series, three of the penis [in the table, this is shown as the lip] and three of the larynx. Basal cell carcinoma was infrequent, occurring four times only in the series, which is much the same frequency as other authors record, suggesting that the African skin has a greater power of resistance to exposure to sunlight than has that of the European, in whom it is relatively common. Melanomata formed 10 per cent. of all tumours, a high frequency which accords with the experience of other writers, who find that in Africans 70 per cent. of these growths occur in the foot. There were 13 cases of neuroblastoma of the retina in infants, a very high frequency in which other authors concur. There were two cases of Kaposi's haemorrhagic sarcoma, also a relatively frequent condition in Africans.

[See a paper on cancer in French West Africa by JONCHÈRE, *Bulletin of Hygiene*, 1950, v. 25, 272.] *W. L. Harnett*

VERLINDE, J. D. Toxoplasmose. [**Toxoplasmosis.**] *Nederl. Tijdschr. v. Geneesk.* 1950, Jan. 7, v. 94 (i), No. 1, 9–15. [Refs. in footnotes.]

A general review.

PROTOZOOLOGY : GENERAL

ISERLE, J. & MARŠÁLEK, E. Naše zkušenosti s toxoplasmosou u člověka. [**Observations on Human Toxoplasmosis.**] *Časopis Lékařů Českých.* Prague. 1949, Dec. 9, v. 88, No. 49, 1423–5. [11 refs.] English summary (2 lines).

Report of a case in Czechoslovakia.

MANTZ, F. A., Jr., DAILEY, H. R. & GROCOTT, R. G. **Toxoplasmosis in Panama : Report of Two Additional Cases.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 895–908, 7 figs. [39 refs.]

An inapparent or asymptomatic case of toxoplasmosis was discovered in Panama. It occurred in an American soldier accidentally drowned in the Canal, and was diagnosed by the finding of a single pseudo-cyst in a section of heart muscle. A second case was that of a stillborn child whose parents had lived $1\frac{1}{2}$ years in Panama. The infant was moderately macerated at birth, and the placenta was boggy and diffusely degenerated. The brain was remarkably soft, covered by thickened, adherent meninges, and studded with yellow necrotic areas each about a centimetre in diameter. Organisms resembling *Toxoplasma* were seen in smears made from the surface of the brain, in sections of the organ (in necrotic areas associated with phagocytosis and in pseudocysts unaccompanied by a cellular reaction) and in guineapigs inoculated with brain suspensions. Although macroscopic abnormalities were present in many organs including the eye, the organism in the form of large pseudocysts (up to 150 μ in length) was only detected in the brain and in sections of striated muscle (tongue, shoulder muscles, hamstrings, etc.). The infections did not

kill guineapigs, though typical lesions occurred in the animals. The parents were examined for evidence of the disease; biopsies of muscle proved negative, but the intradermal test (with chick embryo antigen) of WARREN and RUSS [this *Bulletin*, 1948, v. 45, 1035] was positive in both parents.

[The authors rightly emphasize that in a disease as little understood as toxoplasmosis the absolute diagnosis depends upon the demonstration of the organism. They state that 38 cases of the disease have now been described of which eight have come from Panama, a centre thus of relatively high endemicity.] *P. C. C. Garnham*

SUMMERS, W. A. **The Effects of Oral Administration of Aureomycin, Sulfathiazole, Sulfamerazine and 4,4′-Diamino Diphenyl Sulfone on Toxoplasmosis in Mice.** *Amer. J. Trop. Med.* 1949, Nov., v. 29, No. 6, 889–93. [17 refs.]

Sulphonamides and sulphones have previously been shown to protect animals from infections with *Toxoplasma* [this *Bulletin*, 1943, v. 40, 638] but do not effect radical cures. In the present investigation the action of aureomycin on *Toxoplasma* infections in mice has been compared with that of sulphathiazole, sulphamerazine and 4 : 4′-diamino diphenyl sulphone. The infection was maintained in these animals by intraperitoneal injection, at intervals of five to six days, of peritoneal fluid, diluted in saline, from an infected host. The drugs were given in the food for two days before inoculation and for nine days thereafter. On the tenth day after inoculation the drug-diet was replaced with normal diet and the protective effect of the substances noted. A large percentage of untreated controls were dead by the 10th day, and the animals which had been given the drug died at various intervals thereafter, up to approximately the 25th day. In the case of 24 mice treated with sulphone no deaths occurred before the 21st day and six of that number survived in a healthy state for more than 60 days. All the drugs afforded some degree of protection, that of aureomycin being equalled by sulphathiazole, while sulphamerazine was least effective. Para-aminobenzoic acid antagonized the protective action of sulphathiazole and 4 : 4′-diamino diphenyl sulphone but not that of aureomycin. *J. D. Fulton*

JAWAD, H. M. **The Non-Pathogenicity of *Herpetomonas muscarum* to Laboratory Animals.** *J. Roy. Faculty of Med. of Iraq.* 1947, Mar. & Apr., v. 11, No. 2, 50–51.

ENTOMOLOGY AND INSECTICIDES: GENERAL

BEAVER, P. C. & FLETCHER, O. K., Jr. **An Improved Insect Collecting Cage.** *Mosquito News.* 1949, Dec., v. 9, No. 4, 176–7, 1 fig.

GREENBERG, J. **A Method for Artificially Feeding Mosquitoes.** *Mosquito News.* 1949, June, v. 9, No. 2, 48–50, 2 figs.

The author describes the construction and use of a simple heating element for use when it is necessary to feed large numbers of *Aëdes aegypti* or other thermotropic bloodsucking insects on blood or other test fluids.

The element consists of nichrome wire strung between two asbestos rings held apart by three brass rods. The inside diameter of the rings is sufficient to accommodate a feeding tube. The whole unit is enclosed in an open-ended brass cylinder and connected, through a variable condenser, to an electricity supply point.

In the author's experiments six such units were mounted over holes in an asbestos board and six lamp chimneys containing mosquitoes were placed beneath the holes.

Feeding tubes cut from glass tubing had one end covered with a membrane, and one of these tubes containing 2–3 ml. of test fluid was placed inside each heating element so that the membrane rested on the netting of the lamp chimney below it. The mosquitoes were attracted to the warm fluid on which they fed through the membrane. *H. S. Leeson*

PRATT, J. J., JR., HETERICK, R. H., HARRISON, J. B. & HABER, L. **Tires as a Factor in the Transportation of Mosquitoes by Ships.** *Milit. Surg.* Washington. 1946, v. 99, No. 6, 785–8. [Summary taken from *Rev. Applied Entom.* Ser. B. 1949, Dec., v. 37, Pt. 12, 221.]

Living mosquitos were observed in one of the holds of a cargo ship from the New Guinea area during routine inspection on arrival at Los Angeles in June 1945, and members of the crew had been annoyed by mosquitos for 5–6 days after leaving port. Further investigation showed that about half of the 8,880 motor and aircraft tyres that constituted much of the cargo contained fresh water and many of them contained 20–30 living mosquito larvae. *Aëdes scutellaris*, Wlk. (*hebrideus*, Edw.) and *Armigeres milnensis*, Lee, were recovered from practically all the tyres in which larvae were found, and *Culex papuensis*, Tayl., and a species of *Tripteroides* near *quasiornata*, Tayl., were present in smaller numbers. Two larvae and one dead adult of *Megarhinus* sp., and one dead female of *C. annulirostris*, Skuse, were also recovered. Before the ship docked, each hold was closed and treated with a pyrethrum aerosol. Many dead adult mosquitos were subsequently recovered. As the tyres were unloaded, those containing water were sprayed with 5 per cent. DDT in kerosene, and the walls, ceilings and floors of the railway wagons to which they were to be transferred were also sprayed to kill any adults that might emerge in transit. Three wagons were inadvertently loaded before spraying had begun. A pyrethrum aerosol was released into each, and they were immediately sealed. They were again treated with aerosol on arrival at their destination five days later. When they were opened, living larvae were found in large numbers in many of the untreated tyres.

Ten more shipments of tyres were inspected between 9th July 1945 and 4th February 1946. Tyres in eight of them contained water, and mosquitos, including *Aëdes albopictus*, Skuse, *A. scutellaris*, *Armigeres milnensis* and *C. papuensis*, were breeding in three shipments. Fresh water was also found in amphibious vehicles, but no larvae or pupae. All the water was treated with 5 per cent. DDT in kerosene. The bionomics of the species found, their importance to man, and the effect on them of conditions on the journey and the climate at Los Angeles are briefly discussed ; in view of the large number of larvae that can be imported in one shipload of tyres, strict precautions should be taken to prevent the introduction of exotic mosquitos into the United States.

PARKER, A. H. **Observations on the Seasonal and Daily Incidence of certain Biting Midges** (*Culicoides* **Latreille-Diptera, Ceratopogonidae**) **in Scotland.** *Trans. Roy. Entom. Soc. of London.* 1949, Oct. 4, v. 100, Pt. 7, 179–90, 2 figs. [11 refs.]

The author collected adult midges (*Culicoides*) from two sites at Rossdhu, on the west bank of Loch Lomond from the beginning of June until almost the end of October, 1947. A standardized method of hand netting the insects above ground level was adopted in preference to sampling techniques dependent upon active responses of insects.

Culicoides impunctatus, *C. pallidicornis* were most abundant in early July and were obtained from early June to the end of August. *C. heliophilus* had a shorter seasonal incidence and an earlier peak of activity. *C. obsoletus* group and *C. pulicaris* were obtained from June to October in numbers too small to show a peak. The male : female ratio of the adults captured varied greatly with different species.

A possible explanation for the abnormal sex-ratio of most of the species captured is that the sexes have different habits.

Maximum numbers were obtained between three hours or more before and one hour after sunset : insects were almost completely absent at other times except for a small peak at sunrise. The evening peak for the females of *C. pallidicornis*, *C. impunctatus* and *C. obsoletus* group and *C. pulicaris* males was around sunset, whereas it was several hours earlier for *C. pallidicornis* males and *C. heliophilus* females. The males of *C. pallidicornis* were observed to be dancing in swarms.

No insects were caught during strong winds. No relationship was shown between numbers captured and temperature or humidity : this may have been due to the paucity of comparable data. Soft rain had little effect. Evening flight in relation to sunset tended to be earlier on darker evenings.

C. impunctatus females were more strongly attracted to man than the females of the other species.

The author compares the Rossdhu collections with collections made by other investigators, including HILL [this *Bulletin*, 1948, v. 45, 117]. His results do not support the statement of GOETGHEBUERC (*Ann. Soc. Ent. Belg.* 1919, v. 59, 25) that *C. pulicaris* passes through several generations per annum, or that of CAMERON *et al.* [*Bulletin of Hygiene*, 1947, v. 22, 132 ; 1948, v. 23, 623] that *C. heliophilus* probably passes through two generations per annum.

A suggestion is offered that the difference of several hours between the times of maximum incidence of males and females of *C. pallidicornis* occurs because the females feed on crepuscular animals while the males require a certain intensity of light for effective swarming. An internal rhythm is not thought to be involved in the regular evening and morning flights. *A. Smith*

MULHERN, T. D. & HART, J. T., Jr. **A Low Cost, Light Weight Excavator for Digging or Cleaning Mosquito Control Ditches.** *Mosquito News.* 1948, Dec., v. 8, No. 4, 137–9, 2 figs.

PARAMONOW, S. J. Bestimmungstabelle sämtlicher Entwicklungsstadien der Magendasseln. (Fam. *Gastrophilidae* ; *Dipt.*). [**A Key to the Developmental Stages of Species of** *Gastrophilus*.] *Ztschr. f. Parasitenk.* 1949, Jan. 14, v. 14, Nos. 1/2, 27–37, 16 figs.

SKALIY, P. & HAYES, W. J., Jr. **The Biology of** *Liponyssus bacoti* (**Hirst, 1913**) (**Acarina, Liponyssidae**). *Amer. J. Trop. Med.* 1949, Sept., v. 29, No. 5, 759–72. [30 refs.]

A brief review is given of the rôle of blood-sucking mites in the transmission of protozoan, helminthic and virus infections. The present study of the biology of *Liponyssus bacoti* was undertaken as a supplementary enquiry in connexion with fresh investigations on the rôle of the mite as a vector of murine typhus. The techniques employed for manipulating the mite were adapted from those developed by the reviewer and his colleagues [see this *Bulletin*, 1946, v. 43, 1197]. The authors' summary is as follows :—

" The observations on the effect of temperature and relative humidity appear to establish within rather narrow limits the conditions of the micro-environment

under which the mite can multiply either in the laboratory or in nature. Since the eggs are always laid away from the host, the natural environmental temperature determines their hatching. Egg laying, and therefore reproduction, does not occur at 6° to 8°C., although the adult may live for more than a month at these temperatures. Eggs are laid and protonymphs develop at 12° to 14°C. Protonymphs in nature feed on the body of the rat deep within the fur and protected from a cold environment. It appears likely that 12° to 14°C. represents the lowest temperature at which *L. bacoti* can reproduce, and then only with a great lengthening of the cycle and an increase in mortality.

"At low and intermediate temperatures, these mites can tolerate a wide range of relative humidity. At 24° to 26°C., they withstood a relative humidity of 18 to 20 per cent. However, with increasing temperatures, increasing humidity is necessary to permit survival. Slightly over 60 per cent. relative humidity is necessary to permit a complete cycle at 34° to 36°C., while even at 100 per cent. relative humidity all mites died at 36° to 38°C.

"At least for the temperatures and relative humidities studied, the conditions of the open laboratory (24° to 26°C. and 47 per cent. relative humidity) gave the best over-all opportunity for development and permitted rearing to the adult stage of 62·5 per cent of some 627 eggs studied under those conditions. There was, however, some evidence that humidities higher than 47 per cent are more favourable to survival of the egg. In the open laboratory, the average life of the adult female was 61·9 days and the average number of eggs per female 98·8; a little over ¾ of the mites reached the adult stage between the 11th and the 16th day. These figures suggest a considerable reproductive ability in *L. bacoti* and, since they undoubtedly reflect some mortality due to handling, it may be that the mites reproduce even more efficiently in nature under favourable conditions.

"Observations in January and February 1948 at Savannah showed the lowest temperature of even the accessible portion of both protected and unprotected *Rattus norvegicus* burrows was 7·2°C. while the highest temperature was 20·5°C. The relative humidity of these burrows was usually over 90 per cent but never as high as 100 per cent. Temperature changes in the burrows always lagged behind and were less marked than those of the environment. The average burrow temperature in winter was warmer than the environmental temperature. These observations suggest that, even in the coldest months of winter, many days occur in the Savannah climate which could permit some reproduction of *L. bacoti*.

"The laboratory studies suggest some of the factors which may be expected to favour the appearance of excessive numbers of *L. bacoti* or to greatly reduce these ectoparasites in nature.

"No significant difference occurred in the total egg production and in the length of the adult period of fertilized and unfertilized females. Unfertilized eggs developed parthenogenetically into male offspring which as adults, were capable of fertilizing female adults." *D. S. Bertram*

DUGUET, J. **Disinsectization of Aircraft. Study made in connexion with the Revision of International Conventions.** *Bull. World Health Organization.* Geneva. 1949, v. 2, No. 2, 155–91. [89 refs.] [Summary appears also in *Bulletin of Hygiene.*]

Considerable data exist to show the dangers of possible transfer of insects, including disease vectors, long distances by aircraft. A proportion of the insects arrive alive, even, in some cases, after disinsectization measures have been carried out. Of the normal conditions occurring in aeroplanes in flight, changes in barometric pressure and low temperature are harmless to insects; hot dry conditions and vibration are harmful.

Various summaries of aircraft inspections by different authors are briefly mentioned [this *Bulletin*, 1932, v. 29, 825; 1936, v. 33, 343; 1939, v. 36, 640]. Several species of mosquito which transmit yellow fever have been found, and also malaria vectors. A few other biting diptera of medical and veterinary importance (*e.g.*, *Stomoxys calcitrans* and *Glossina palpalis*) are also mentioned.

The dangers concerned with spread of yellow fever in the world by human carriers has largely disappeared because of compulsory inoculation. The remaining possibility is the transport by air of an infected female *Aëdes* which manages to bite a non-inoculated person in a clear zone where, however, the mosquito is present. The danger is perhaps not excessive, as *Aëdes* has been only very rarely encountered in aircraft inspections.

The importance of air travel in regard to spread of malaria was once considered slight, in view of the fact that this disease is already so widespread in the tropics. However, the problem of excluding malaria vectors becomes important in areas which have undertaken mosquito eradication campaigns.

Insecticides

An insecticide suitable for disinfesting aircraft should have the following characteristics:—

(*a*) No fire risk (to permit use with motors running).
(*b*) Rapid action (to reduce time without ventilation).
(*c*) Great diffusibility.
(*d*) Non-toxicity to man.
(*e*) Ease of application and simple equipment.

Pyrethrum is one of the most suitable substances for this use. Experiments of earlier authors have shown that a mist containing about 100 mgm. of pyrethrins per 1,000 cu. ft. should kill all mosquitoes in five minutes.

DDT is another valuable insecticide for this purpose, especially in combination with pyrethrins. Sprays containing

0·05 per cent. pyrethrins and 0·3 per cent. DDT
or 0·03 per cent. pyrethrins and 0·5 per cent. DDT

have been found effective.

Application

Early investigators found that the use of hand atomizers was unreliable. Compressed-air spray guns working at 3 kgm./sq. cm. (43 lb. sq. in.) are satisfactory. The compressed air may be supplied by hand pumping, from an air compressor or from an air bottle.

Aerosols are widely used for disinfesting aircraft on account of their good diffusing and penetrating powers. They may be produced in various ways, but the most convenient is the "Freon bomb".

The final formula of the aerosol bomb approved by the U.S. Public Health Service is as follows:—

Pyrethrins	1 per cent. by weight [*i.e.*, 5 per cent. of a 20 per cent. pyrethrin extract]
DDT	3 ,, ,, ,, ,,
Cyclohexanone	5 ,, ,, ,, ,,
Mineral Oil	2 ,, ,, ,, ,,
Freon 12	85 ,, ,, ,, ,,

This must be dispersed for 4–5 seconds per 1,000 cu. ft. which normally results in emission of 50 mgm. pyrethrins.

One objection to the use of aerosol bombs is that dosage is calculated from the time during which the bomb acts. The output, however, may not be constant. Rate of emission may vary from bomb to bomb even of the same manufacture and also the emission varies with the temperature of the contents.

A very effective method of disinfesting normal aircraft is a built-in system which comprises several bomb-type diffusers at different points inside the aeroplane. These are all operated simultaneously by solenoids, on the movement of a switch in the pilot's cabin. The whole apparatus weighs 13 lb. (6 kgm.) of which 3 lb. (1·4 kgm.) is insecticide. This allows 20–30 treatments, after which the containers must be refilled. This built-in system is not suitable for aircraft with pressurized cabins owing to their particular ventilation arrangements.

Advantage of the residual toxicity of DDT may be taken by applying it to interior of the fuselage and to furnishings of the aircraft. A treatment of 200 mgm. per sq. ft. (2·15 gm. sq. m.) should be effective for about a month (precise details are lacking). This treatment would supplement the use of aerosols, but could not be relied upon alone, since mosquitoes could rest on passengers' clothing or baggage without harm.

International Standardization

A questionary sent to various States by a Commission of WHO elicited the following replies : 15 States had no clearly defined methods of disinfestation (because their risks were considered small, etc.) ; eight States prescribe use of the Freon bomb ; eight require either the bomb or a spray of pyrethrins with or without DDT ; three rely on spraying only ; eight States recommend DDT alone, dispersed in various forms.

Regulations regarding other aspects of disinfestation are even more variable. There is a general tendency for States to devote all attention to *incoming* traffic and neglect the dangers of spreading their own pests elsewhere.

The following require definition and international agreement :—

(1) Aircraft requiring disinsectization.

This is defined in the International Sanitary Convention for Aerial Navigation 1933–44. The author considers that it should be extended to cover the possibility of carrying passengers with yellow fever, even if the aircraft itself has not visited an endemic area, when *Aëdes* mosquitoes might be aboard.

(2) Type and quantity of insecticides.

Three are recommended :—

(*a*) Pyrethrin-DDT aerosol (1 per cent. and 3 per cent. respectively) dispersed at the rate of 50 mgm. pyrethrins per 1,000 cu. ft.

(*b*) Pyrethrum extract in emulsion or solution (in a solvent with flash point above 49°C.). To be sprayed at the rate of 100 mgm. pyrethrins 1,000 cu. ft.

(*c*) Pyrethrins, 0·1 per cent. and DDT, 0·3 per cent., in volatile kerosene (flash point over 49°C.). To be sprayed at the rate of 50 mgm. pyrethrins/1,000 cu. ft.

The insecticides (*b*) and (*c*) to be sprayed by compressed air sprayers (3 kgm./sq. cm.) to give a fine, stable mist.

In all cases, the aircraft is to be kept sealed for at least five minutes after treatment.

(3) Time of disinfestation.

The most suitable times for treatment differ with different kinds of aircraft and the matter is still a subject of controversy. Evidence shows that treatment during flight is difficult owing to leakage and air currents.

The author's suggestions are (briefly) :—

(*a*) *Treatments on departure.*

(i) Baggage and freight compartments to be done just before sealing. Undercarriage, etc., to be done five minutes before starting motors.

(ii) Aircraft with pressurized cabins should be treated before superchargers and auxiliary ventilators are connected to the cabin ; *i.e.*, after closing all apertures and before taking off.

(iii) Most other aircraft to be done ten minutes after take-off. The ventilators to be kept closed for five minutes.

(iv) Military aircraft to be treated five minutes before starting engines.

(*b*) *Treatments on arrival.*

(i) Baggage and freight compartments to be treated as soon as the engines have cooled to avoid fire-risk.

(ii) Pressurized aircraft to be done on landing as soon as the engines have stopped.

(iii) Other aircraft to be done, either at least ten minutes before landing, or on landing, as soon as motors have stopped.

(4) General Procedure.

The spaces to be treated are listed; in general, all accessible internal spaces should be done. External crevices are generally unsuitable for insects owing to violent wind currents; but recesses under the wings (undercarriage, wing hatches and flap housings) may permit insects to travel safely.

In dispersing insecticide the operator should move about to distribute the aerosol or spray. Aerosol bombs should be held vertically. To calculate dosage, maximum length × maximum height × maximum width × 0·8 gives a rough guide.

(5) Responsible Authority.

Regulations of those States requiring treatment during flight leave the burden of treatment on the aircraft captain and crew. States requiring disinfestation on landing delegate the responsibility to ground health authorities. The author considers the former method most reliable, subject to careful systematization. But it is very easy to "skimp" such treatments and air crews may perhaps be dissuaded from effective treatments by the unpleasant effects of heavy dosage on passengers and themselves.]

Effectiveness of Disinfestation of Aircraft.

In one year (1944–45) 24,930 insects, including 1,418 mosquitoes of which 158 were still alive despite disinfestation measures, were taken from 12,367 aircraft arriving in U.S. Territory. However, from 1943 to 1946 only one exotic anopheline species and one culicine species were discovered; no live mosquitoes were found other than indigenous species. *J. R. Busvine*

HADAWAY, A. B. & BARLOW, F. **Further Studies on the Loss of Insecticides by Absorption into Mud and Vegetation.** *Bull. Entom. Res.* 1949, Dec., v. 40, Pt. 3, 323–43.

This is a fuller account of work described in a preliminary report by the authors [BARLOW and HADDAWAY, this *Bulletin*, 1947, v. 44, 1053]. Studies were made of insecticidal deposits on mud blocks (to simulate the mud walls of native huts) and on foliage. The insecticidal effects were determined by exposing either tsetse flies (*Glossina palpalis*) or mosquitoes (*Aëdes aegypti*) to the treated surfaces for standard times.

Chemical estimations of DDT and BHC were made on mud scrapings, washings from leaves and from whole dried leaves. An indication of the vertical distribution of insecticide in the mud blocks was obtained by scraping off a thin superficial layer (about 0·07 mm. deep), extracting the insecticide and estimating it chemically and comparing the amount with a similar extraction of a thick layer (3 mm.) containing the rest of the deposit. The greater proportion in the superficial layer, the greater insecticidal effect was to be expected. Various oil solutions of DDT (Diesoline, kerosene, etc.) left about 8 to 19 per cent. in the top layer. There was some indication that solvents with higher surface tension tended to leave a smaller quantity of insecticide in the superficial

layer than solvents of lower surface tension (presumably because the latter penetrated farther).

Careful experiments showed that a proportion of DDT in kerosene was adsorbed on mud even if the mud was previously heated to oxidize organic constituents. The amount corresponded to about 15 mgm./sq. ft. when 100–200 mgm./sq. ft. of DDT had been applied.

Increasing the dosage of 5 per cent. DDT in kerosene from about 150 to over 1,000 mgm. DDT/sq. ft. resulted in a smaller percentage of the deposit remaining in the superficial layer.

Repeated sprayings of 5 per cent. DDT in kerosene at weekly intervals built up the deposit from 486 to 722 mgm. DDT/sq. ft. in five applications but the percentage in the outer layer fell slightly (14 to 10 per cent). Pre-treatment of mud surfaces did not alter the amount in the superficial layer.

Blocks slightly roughened (by scraping) were more insecticidal than smooth blocks with the same DDT deposit.

Applications of DDT in emulsion form to give 100–200 mgm. DDT/sq. ft. left about 30 per cent. DDT in the superficial layer. This was more insecticidal than the deposit from a kerosene solution. Addition of coumarone resin to the emulsion had no beneficial effect.

Applications of DDT dispersible powder left the highest proportion of insecticide superficially (45 to 75 per cent.). The superficial amount, in one case, was definitely increased by raising the dosage. Corresponding to this superficial distribution, the insecticidal effect was much greater. Thus :—

	Percentage mortality after exposure to 100–200 mgm./sq. ft.			
	Glossina		*Aëdes*	
	15 sec.	15 min.	½ hr.	1 hr.
DDT in solution	—	5–40	—	10–15
,, ,, emulsion	5–25	50–75	—	43–69
,, ,, suspension	90–100	—	56–90	100

Experiments with BHC applied as an aqueous suspension of a dispersible powder gave similar results (*i.e.*, large proportion superficial and high toxicity). But the toxicity and the amount present superficially fell off considerably over a period of four weeks, presumably owing to the evaporation of the BHC.

The amounts of DDT penetrating into the interior of leaves was found to vary with different leaves and even on different parts of the same leaf ; this was indicated by the penetration of Waxoline Red dye into the leaf.

The amounts determined externally and in the interior of certain leaves were as follows :—

Leaf	DDT applied in	mgm./sq. ft. leaf surface	
		External	*Internal*
Avocado pear	Kerosene solution + cotton seed oil ...	79 and 88	13 and 15
,, ,, ...	Emulsion	64 and 81	9 and 10
,, ,, ...	Dispersion	39 and 63	0 and 4
Coffee	Kerosene + cotton seed oil	61 and 45	47 and 67

Traces of DDT were found in untreated leaves of young coffee and Avocado pear, several days after other leaves on the same plants had been treated with DDT ; this suggests internal transport of the insecticide.

Leaves treated with DDT in emulsions remained toxic to tsetse flies longer than leaves treated with oil solutions. Leaves treated with aqueous suspensions lost their effect rather rapidly by weathering (*i.e.*, washed off by rain).

Deposits of DDT on glass plates exposed to sunlight lost their toxicity much more quickly than others kept in the laboratory. To a large extent this is because the deposits exposed to the sun dried into resinous deposits whereas the others remained as supersaturated droplets, readily crystallizing as fine needles on mechanical stimulation. There is also some chemical change induced by sunlight though it does not appear to be loss of hydrochloric acid from the molecule.

J. R. Busvine

JONES, R. W. & HOLTEN, J. R. **Jeep Exhaust Venturi Aerosol.** *Mosquito News.* 1949, Dec., v. 9, No. 4, 161–5, 4 figs.

RANGANATHAN, S. K., KOSHI, T. & SITARAMAN, N. L. **Methyl Anthraquinone (Tectoquinone)—a Synergist for 2, 2-*bis*-(p-chlorophenyl)-1,1,1-trichloroethane (D.D.T.)** [Correspondence.] *Nature.* 1949, Dec. 24, 1095, 1 graph.

Investigations by the authors in Kanpur have shown that the potency of glass plates treated with DDT can be increased by storing them in a box made of Burma teak (*Tectona grandis* L). β-methyl anthraquinone is a constituent of teak and the authors studied the action of this agent in toxicity studies against *Culex fatigans*. Parallel tests were made with DDT *pp'*-isomer alone and with added β-methyl anthraquinone : the latter was also tested alone as a control and was found not to produce any kill in all the concentrations used. The insects were kept for 60 minutes on filter papers impregnated with the test materials in liquid paraffin and mortality recorded after 24 hours. A typical result is shown in a graph and it is evident that β-methyl anthraquinone [referred to incorrectly in this case as α-methyl anthraquinone] showed a striking synergistic property when added to DDT.

Experiments on persistence of residual films in glass against the same test insect showed that with DDT alone at 56 mgm./sq. ft. for a contact period of 10 min. the mortality rate fell below 50 per cent. in about three days : when 2 per cent. of β-methyl anthraquinone was added to an equivalent concentration of DDT mortality greater than 50 per cent. for 14 days was produced.

Full details will be published elsewhere, but the authors add that the synergism has been traced *inter alia* to *p*-benzoquinone and benzil.

H. J. O'D. Burke-Gaffney

LABORATORY PROCEDURES

STEEDMAN, H. F. **An Ester Wax for Use in the Tropics.** *Nature.* 1949, Dec. 24, 1084–5.

Histopathologists in the tropics are familiar with the need for using paraffin wax having a higher melting point than that usually used in temperate regions. This involves infiltration of tissue material at higher temperatures than is desirable, waxes of 60°–70°C. (140°–158°F.) melting point being required.

The author, from the Zoology Department of the University of Glasgow, describes a variation of the standard ester wax formula, which provides low

temperature infiltration with a very hard product as the final block. The modification is as follows :—

Diethylene glycol distearate	80 gm.
Ethyl cellulose, low viscosity	4 gm.
Stearic acid	5 gm. m.p. 53°C.
Castor oil	4 gm.
Diethylene glycol monostearate	5 gm.

This tropical ester wax is designed for use at room temperatures of 75°–90°F. (24°–32°C.). Its performance at room temperatures below 70°F. is poor, and to avoid confusion with the standard mixture it is being marketed (by the British Drug Houses, Poole, Dorset) with a trace of added pink colour.

The performance of the tropical ester wax at temperatures of 75°, 85° and 90°F. are shown in a table. Section ranges are from 4 to 25 μ, ribbon ranges from 4 to 25 μ and compression ranges at 8 μ from 12 to 14 per cent., with slight variations for each of the three temperatures. These ranges should be sufficient for most purposes, but may be improved by the use of a microtome knife of first-class sharpness.

The author adds the following practical points :—

(1) Blocks, essentially with straight parallel sides, should be cut with a stout, sharp knife much more slowly than in the case of paraffin wax.

(2) The block should be warmed before trimming to avoid flying particles of shattered wax.

(3) After some weeks in the oven, slight separation of constituents may occur : a little heating over a bunsen burner will re-dissolve them.

(4) A clearer block results if the wax is heated a few degrees above its melting point before pouring : the specimen should be put into the mould when a thin skin of wax is seen next to the L pieces. It should be cooled, but not submerged, in water.

(5) Tropical ester wax is soluble in alcohols, ethers, esters, ketones, hydrocarbons, etc. The author recommends ethylene glycol, mono ethyl ether or cedarwood oil as clearing agents. *H. J. O'D. Burke-Gaffney*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

BOYD, J. S. K. **Fifty Years of Tropical Medicine.** *Brit. Med. J.* 1950, Jan. 7, 37–43.

A brief account of the outstanding advances made in the understanding and control of tropical diseases during the past 50 years is a useful reminder of the immense value of a few fundamental conceptions which we owe to the great men of generations recently passed. From the work of Pasteur and Koch the control of plague, cholera, yellow fever and other diseases takes origin ; from the insight of Manson and Ross has arisen the whole field of control of insect-borne diseases ; from the work of Ehrlich the conception of chemotherapy ; and from the observations of Fleming and Florey the conception of antibiotics.

In this paper Brigadier Boyd mentions the various important discoveries which have been made by research workers and doctors in the field, who have elaborated the basic findings of the earlier giants. It is a fascinating story, and those who read it could bear in mind that these diseases are not remote and rare ; they affect the majority of mankind, and their control deserves more support than is usually afforded to the relatively few men who undertake it, under adverse conditions, throughout the tropics. *Charles Wilcocks*

TODD, J. W. **Army Medicine in the Late War. Some Mistakes of Policy?** *Lancet.* 1949, Dec. 17, 24 & 31, 1143–8; 1195–8; 1229–35. [11 refs.]

The author analyses some aspects of medical policy in the late war, particularly referring to South-East Asia and Great Britain, drawing attention to aspects of it which, it is claimed, led to misuse of man-power.

Prominent among the alleged faults are failure to introduce mepacrine prophylaxis against malaria until 1944, or in some units, 1945; unnecessary directions on the diagnosis and treatment of malaria which led to extreme periods of invalidism for infections which were, in fact, often mild; similar unnecessary official direction on the diagnosis and treatment of amoebiasis, for which an alternative regimen is proposed; the abuse of hospital facilities, particularly the reference to them of men not needing hospital treatment; frequent demands for investigation which often exaggerated a basic psychiatric complaint and the use of hospitals as waiting rooms for persons awaiting discharge or other disposal; a system of medical classification based on objective examination and divorced from an analysis of function which led to much misdirection of men, and on which the author considers the PULHEEMS system to be no more than a minor improvement.

As constructive proposals for the methods of categorization and disposal, the author considers that function should be the basic quality analysed, that on first entry into the Army it should be assessed largely on previous civilian capacity and should subsequently be judged by combatant officers, medical officers only interfering when examinations suggested that an existing disability would be aggravated by war service, or to enquire into matters when a soldier had been dismissed from his unit on grounds of incompetence. The system of medical boarding which led to the discharge of men for disabilities which were often exaggerated, should be replaced by another in which a person shown to be incapable of carrying out his duties should be informed that he is a "useless incompetent without the guts to deserve the honour of wearing the King's uniform". In civil life the author considers that less attention should be paid to objective criteria, and more to the subjective reaction of the patient and to actual functioning. Hospital facilities are abused as by the admission of patients with chronic complaints for investigation, which is often futile or harmful.

Medical categorization is sometimes necessary as a preliminary to employment in civilian life; the author criticizes the tendency to ask medical examiners to state whether a person is capable of undertaking specific work, which he considers a lay responsibility. He also considers it an interference with the liberty of the subject to prevent a man entering an occupation because it might be detrimental to his health, or because he might be unreliable owing to physical disability. He agrees that it is right to prevent a candidate entering a job in which he might be a danger to others.

[In a reformed service, civilian or military, brevity of expression is most desirable. The article under review is about 21,000 words long.]

G. Macdonald

J. PARASITOLOGY. 1949, Dec., v. 35, No. 6, Sect. 2 (Suppl.), 52 pp. **Program and Abstracts of the Twenty-Fourth Annual Meeting of the American Society of Parasitologists, New York, N.Y., Dec. 27, 28, 29, 1949.**

This number of the *Journal* is devoted to the programme and abstracts of the 24th annual meeting of the American Society of Parasitologists, held in New York in December 1949. It contains 111 papers, varying from titles to full-page abstracts.

These do not lend themselves to further summary, but some indication of the papers particularly of medical interest to readers of this *Bulletin* are given below.

These include several papers on the development and cultivation of *Entamoeba histolytica*, experimental infections with this parasite and the effect of antibiotics on it and on other protozoa: studies on the metabolism of parasites: investigation on avian malaria and toxoplasmosis: research on schistosome infections in snails and the prevention of schistosomiasis: the occurrence of echinococcosis in Lebanon: cerebral hydatid infection: experimental infections with cestodes and on the use of antibiotics as bacteriostatic agents in the *in vitro* cultivation of these parasites: and parasitological studies in the Far East.

Most of the papers are single contributions, but 24 authors have presented two papers, seven have presented three and one has presented four, either alone or in collaboration with others. *H. J. O'D. Burke-Gaffney*

MESSINEZY, D. A. **Notes on the Health-Personnel Training Programme of the Anglo-Egyptian Sudan.** *Bull. World Health Organization.* Geneva. 1949, v. 2, No. 2, 289–98.

These notes were made as a result of a brief visit to Khartoum by the author in April 1948. After a description of the composition and organization of the Sudan Medical Service, he describes separately each of the training programmes which are now in operation there. There are ten separate such programmes and the author observes that they together represent a comprehensive and well-integrated scheme. Each has its own Board of Studies with co-ordination arrangements for the whole. As they are now constituted, candidates have the opportunity of advancing from course to course and from lesser to greater responsibilities.

Among the whole 4,000 persons in the service of the Sudan Medical Service, there are only 70 British European officers, so that medical staff is mainly recruited from the local people. The training schemes appeal to them and the improved services are being achieved through the medium of better training facilities and of higher salaries for the better qualified staff.

Formal medical training courses started in the Sudan in 1921 with the Midwifery Training School, though "apprenticeship" courses for minor responsibilities had been in existence since 1919. Full training was launched with the establishment of the Kitchener School of Medicine in 1924: and the courses now range from the 6-years' course in that school which qualifies the graduating medical practitioners to enter for several post-graduate diplomas of the Royal Colleges of Physicians and of Surgeons, to other courses ranging in duration from six months to three years.

These courses include the Omdurman School for Medical Assistants, the training of dressers and nurses, midwives, health visitors, laboratory assistants, public health officers, sanitary overseers, house-to-house inspectors and pharmacists.

Criteria for selection of candidates vary from the requirement of secondary education, the school-leaving certificate and a selection board, to selection by provincial medical inspectors of promising members of their minor staff. The fact that zealous and intelligent candidates may proceed throughout to the higher courses is stressed.

Among the statistics given are the interesting ones that between 1924 and 1947, 95 of 158 who entered the Kitchener School of Medicine subsequently qualified: and that between 1921–1940, 366 persons graduated from the

midwives training course. It is added that most of the deliveries in Khartoum, Khartoum North and Omdurman are now undertaken by certified midwives. Puerperal sepsis is very low and attendance at ante-natal clinics is high.

The author, who had had 2½ years' experience in organizing medical training schemes in Ethiopia, was greatly heartened and impressed by the arrangements in the Sudan : and he stresses the usefulness of similar surveys in other countries, so that some form of standard programmes might be arrived at, which would incorporate the best features of individual schemes. [The present reviewer, who is not without some experience of medical training programmes in tropical Africa, is in complete agreement with the principle of incorporating into the programmes of one country suitably selected features from those of another : but he has some misgivings about too vigorous attempts at standardization in the methods of teaching. Racial, tribal and communal backgrounds in different tropical countries are so diverse that many local factors, customs, and traditions require to be taken into consideration before it can be decided what local needs are and how local initiative may be utilized to the best advantage.]

H. J. O'D. Burke-Gaffney

MacArthur, W. P. **The Identification of some Pestilences recorded in the Irish Annals.** Reprinted from *Irish Historical Studies.* 1949, Mar., v. 6, No. 23, 169–88. [Refs. in footnotes.]

This is an article of the utmost interest, historically and medically, in the reading ; how much more interesting it must have been to hear it delivered as a lecture or address, when one is not pulled up every few moments by reference to footnotes, which are as great a bugbear to the reader as the insertion of glosses in the original is to an inquiring author.

As the title indicates, this is an endeavour to unravel the intricacies of diseases in the distant past described by men with the hazy knowledge of medicine of those days and in a language comprehended by few at the present. The author has delved into the literature of Ireland and found accounts of past epidemics recorded by non-medical writers and evidently consulted later by medical men who added their glosses, many of which were, in the light of modern knowledge, erroneous and some of which have become embodied in later versions and handed down by copyists as if they were part of the original text.

Identification of long-past epidemics is a fascinating study, but often unsatisfactory because, though some are obvious and self-revealing—bubonic plague, for example—others are in no small degree matters of guesswork and conjecture, since accounts of them are often written by laymen, that is non-medicals, who are wont to harp on some prominent symptom, a bubo, blains, haemorrhages, jaundice, which may be common to several diseases. What, for instance, could be more graphic than Defoe's (a layman) account of the plague of London in 1665 which occurred when the author was a child of six years and which really was a description of plague in Marseilles, with a changed venue.

The author in this article deals mainly with bubonic plague, typhus, relapsing fever, and leprosy. Of these, the first is at all times most easily traceable ; the pneumonic form, which must have occurred with moderate frequency at least, is not referred to ; it was probably not known or not recognized as plague and so was overlooked or misinterpreted. Typhus, as gaol fever, was well known and in its typical form was not likely to escape notice, but we must remember that it was not until the latter part of the 19th century that differentiation was made between it and typhoid fever, a matter which seems strange in these days when we can trace little if any resemblance of the one to the other.

Other difficulties arise from the natural changes which occur in diseases ; we may refer, as instances, to smallpox and scarlet fever. Smallpox, once so

universal and so fatal, is now so mild that people prefer to run the risk of catching it rather than submit to the slight discomfort of vaccination. Scarlet fever, a century ago a disease of great severity and high fatality, within little more than a generation became so mild that a fatal case was rarely seen.

But, to return to Sir William MacArthur's paper. Yellow plague was so called, not because it had anything to do either with yellow fever or with plague ; it meant merely a disease of epidemic character in which jaundice was a prominent symptom, very likely, as the author suggests, relapsing fever, though even so renowned a clinician as Graves regarded it as identical with yellow fever of the tropics and, in fact, called it " Yellow Fever of the British Islands ". Such a view indicates a very poor knowledge of the yellow fever of the tropics, though, it is true, yellow fever did occur rarely in England and more on the Continent.

Mortalitas puerorum of the seventh century may have been, as the author discusses, diphtheria, but he decides that its more definite name of *Pestis puerorum* in 1361, after the ravages of the Black Death, was more likely to apply to recrudescence of true plague among adolescents, many of the adults being protected by having survived a previous attack of plague. This is ingenious and may be true, though we do not know how long immunity to re-infection persists in plague.

One of the most interesting parts of this article is that which discusses the significance of the term " leprosy ", which included much more than what we know today as leprosy. The name originally implied any scaly or rough condition of the skin, such as eczema, psoriasis and others ; it was also used for smallpox and scaly conditions of plants, and, as we know from Leviticus, in Mosaic times it was even applied to woollen and linen garments, especially if they showed red or green staining, and to the walls of houses.

A pestilence of " lameness " might be beriberi, but the author rules this out as " There is no evidence of a deficiency of vitamin B in Ireland at any date ". He thinks it was poliomyelitis.

A reviewer is sorely handicapped by ignorance of the Irish words used and he must take for granted the interpretations given of the words and terms. There is, of course, no reason to doubt the correctness of these in this case, as the linguistic erudition of the author is well known, as is also the meticulous care he takes to verify his conjectures as closely as possible. Just one example of the difficulty may be mentioned in conclusion. *Cos dhubh* is said to mean " black leg " and is applied in human beings to the haemorrhages of scurvy, and in cattle in Donegal to anthrax, says the author. [In other countries, and perhaps in other parts of Ireland, " black leg " is a synonym of Black quarter, other names for which are Quarter-evil and Quarter-ill, which is caused by *Clostridium chauvoei* and has nothing to do with anthrax.]

H. Harold Scott

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